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quarterly Bulletin

JANUARY, 1959

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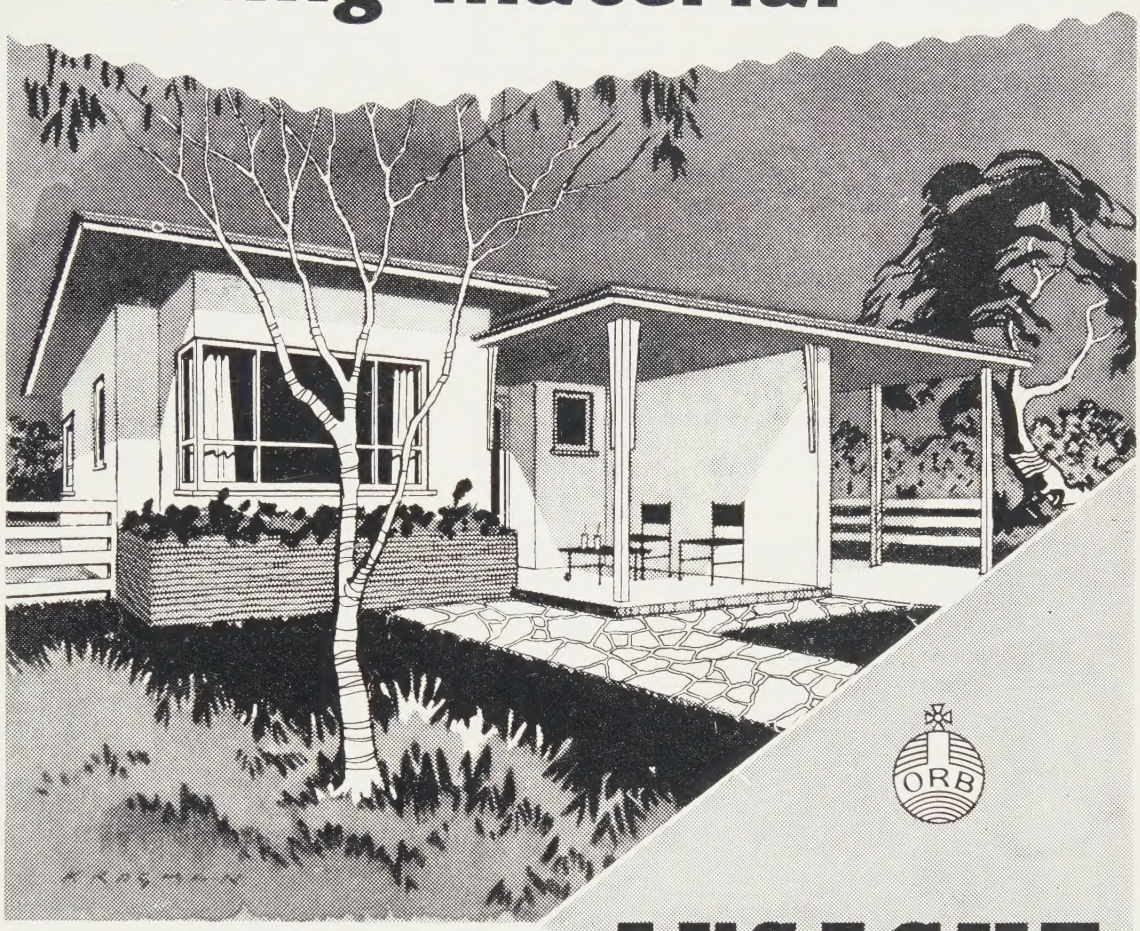

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The South Pacific Commission

The South Pacific Commission is an advisory and consultative body set up in 1947 by the six Governments responsible for the administration of island territories in the South Pacific region (Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America).

The Commission's purpose is to advise the participating Governments on ways of improving the well-being of the people of the Pacific island territories. It is concerned with health, economic and social matters. Its headquarters are at Nouméa, New Caledonia.

The Commission consists of not more than twelve Commissioners, two from each Government. It normally holds one Session each year. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

There is a Research Council meeting once a year. This may be either a meeting of the full Council, or of one or other of its three main sections, specializing in the fields of health, economic development and social development. Members of the Research Council are appointed by the Commission. They are selected for their special knowledge of the questions with which the Commission is concerned, and the problems of the territories in these fields. The chief function of the Research Council is to advise the Commission on what investigations are necessary. Arrangements to carry out those that are approved are the responsibility of the Secretary-General and other principal officers.

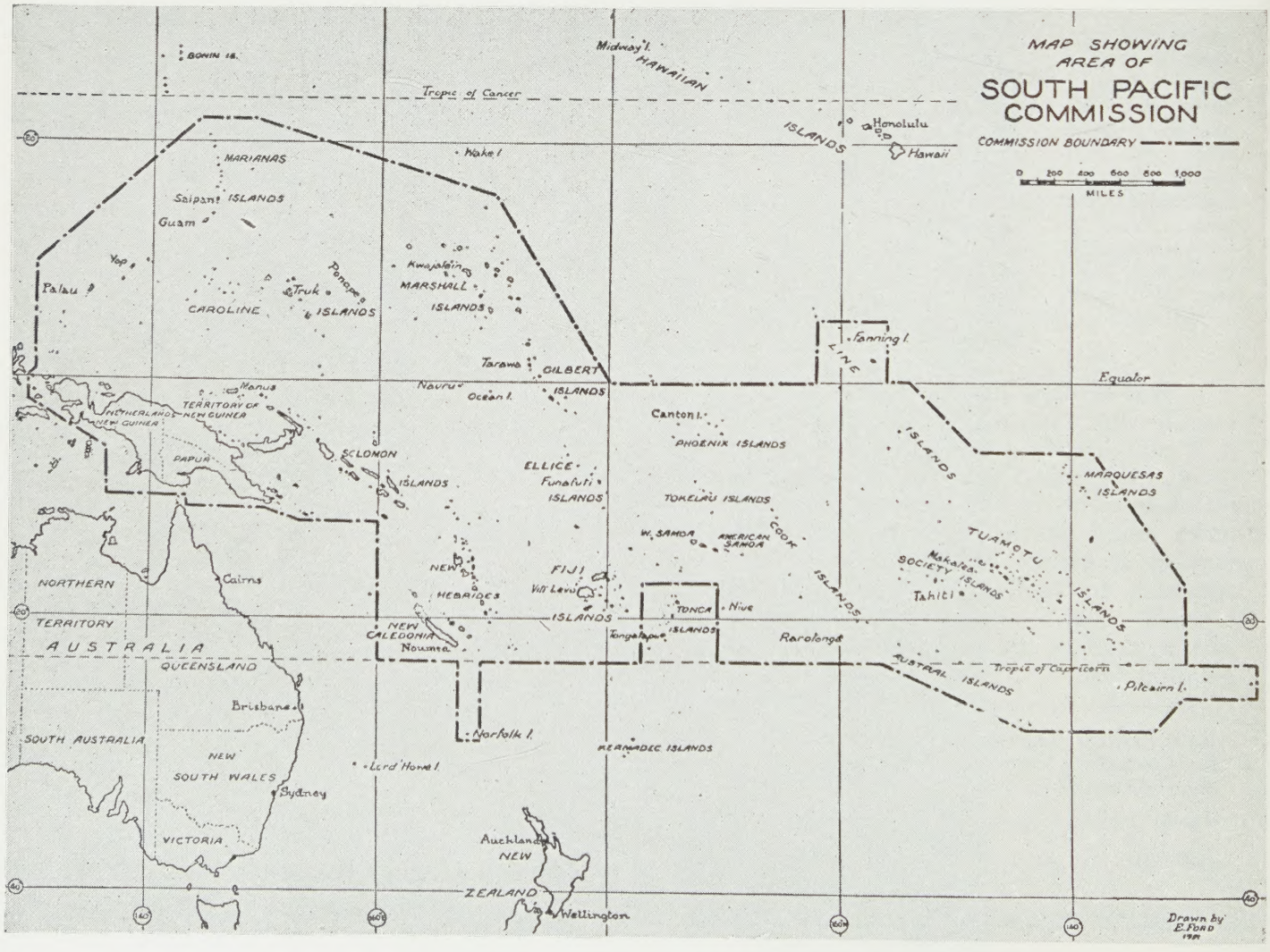
The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Fiji in April 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April 1953. The third Conference was held in Fiji in April-May 1956.

The principal officers of the Commission are: Secretary-General, Mr. T. R. Smith; Executive Officer for Health, Dr. E. Massal; Executive Officer for Economic Development, Dr. A. H. J. Kroon; Executive Officer for Social Development, Dr. Richard Seddon. The powers and functions of the Deputy Chairman, Research Council, are exercised by the Secretary-General.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Nouméa, New Caledonia.

FRONT COVER PHOTOGRAPH

A traditional Samoan welcome. This colourful kava ceremony was held at Pago Pago, American Samoa, at the formal opening on November 10 of the SPC tuberculosis conference. The Governor, the Honourable Peter Tali Coleman, presided. (See article on page 26.)



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EDITOR: *A. E. Read, B.Sc.*

THE SPC QUARTERLY BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

SUBSCRIPTIONS and orders for single copies should be directed to: South Pacific Commission, Box 5254, G.P.O., Sydney, Australia. Subscription rates are given in the Table below.

ALL OTHER ENQUIRIES relating to the SPC QUARTERLY BULLETIN should be directed to: The Editor, South Pacific Commission, Nouméa, New Caledonia.

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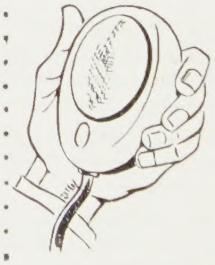

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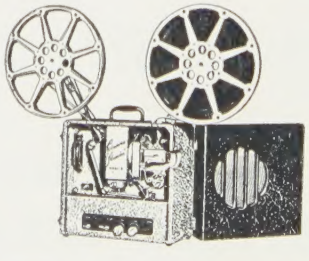

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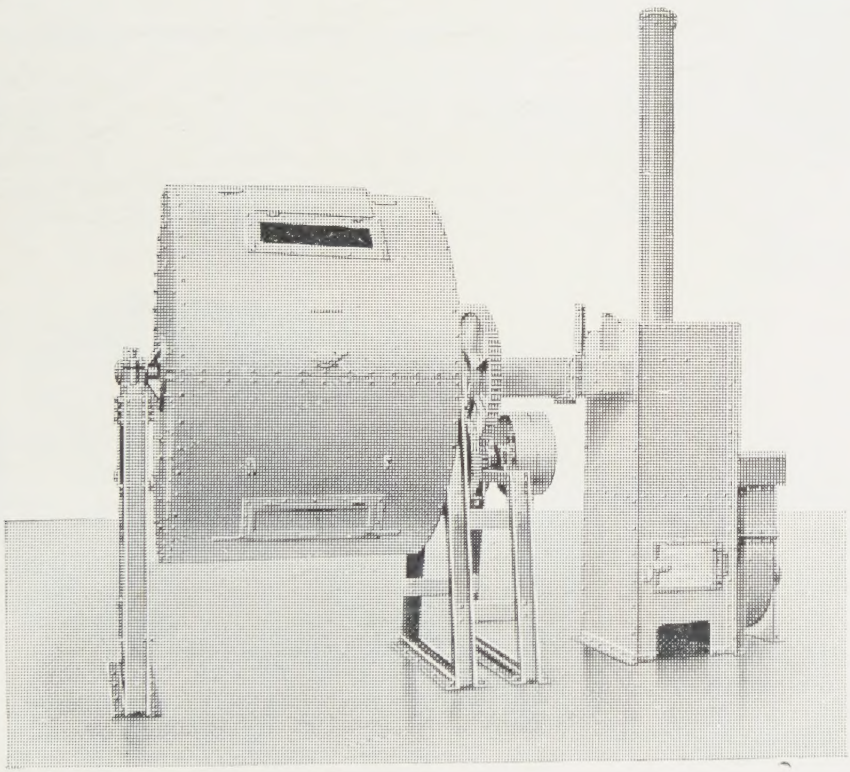

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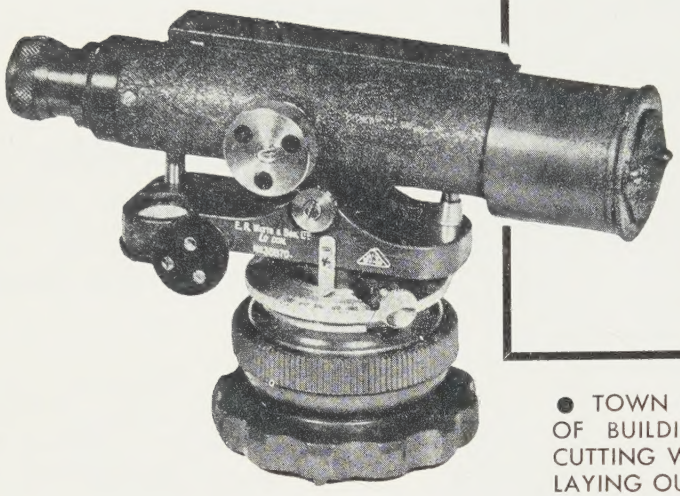

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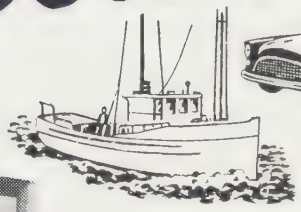

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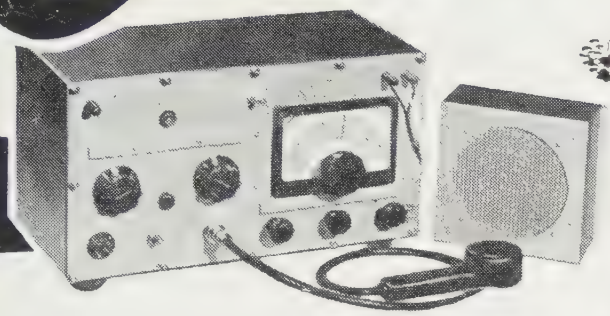

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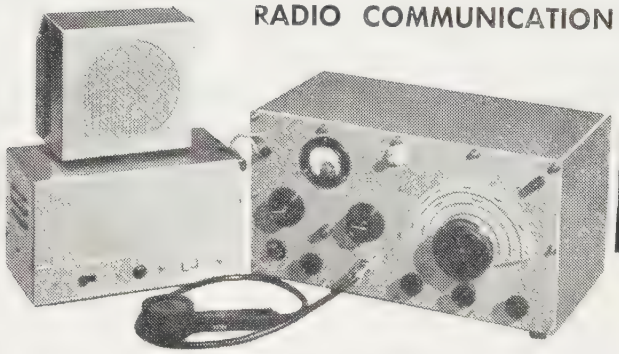

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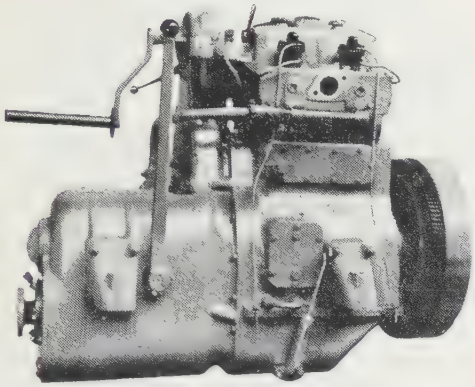

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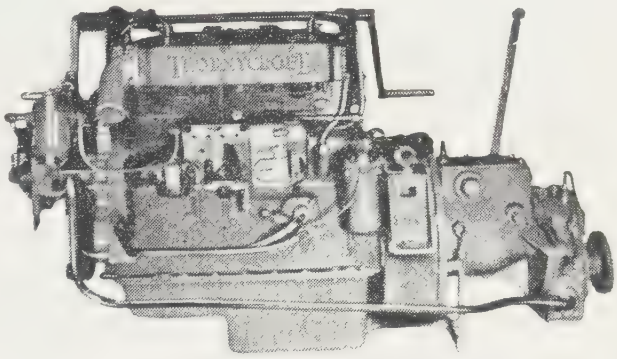

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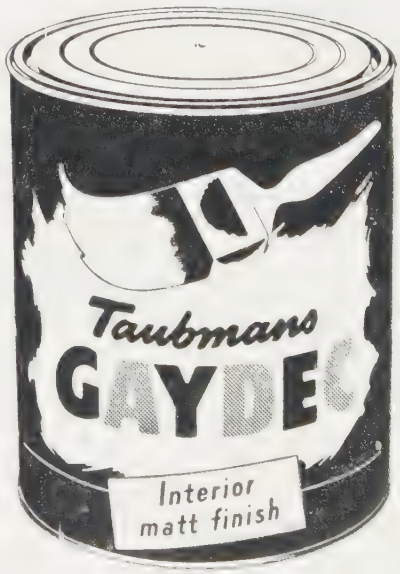

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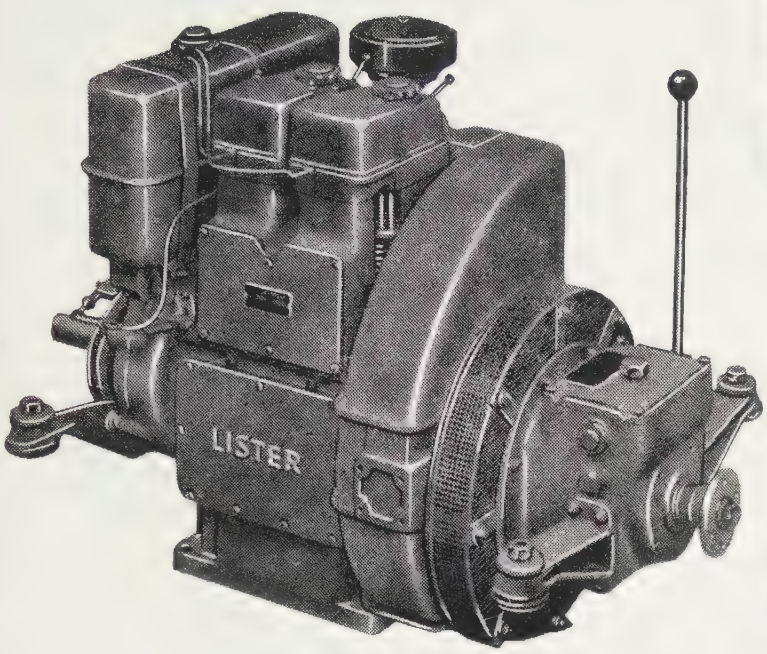

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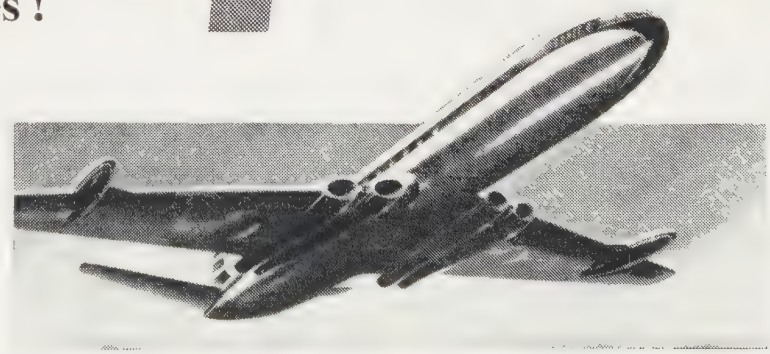

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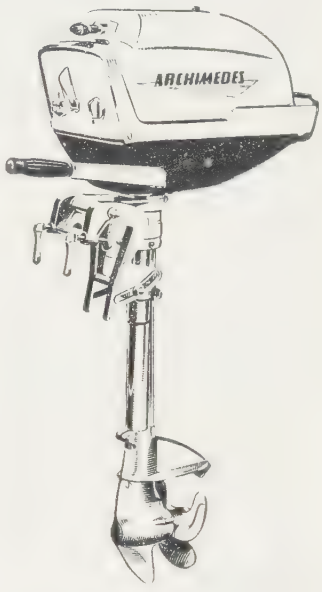

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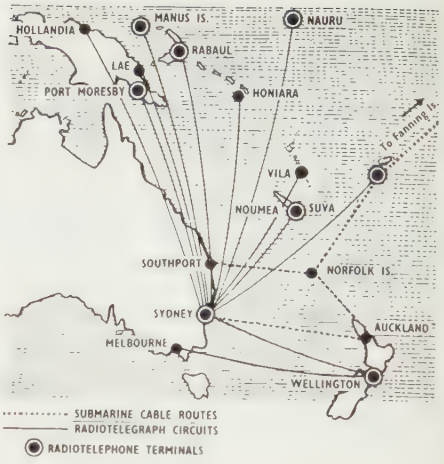

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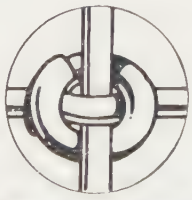

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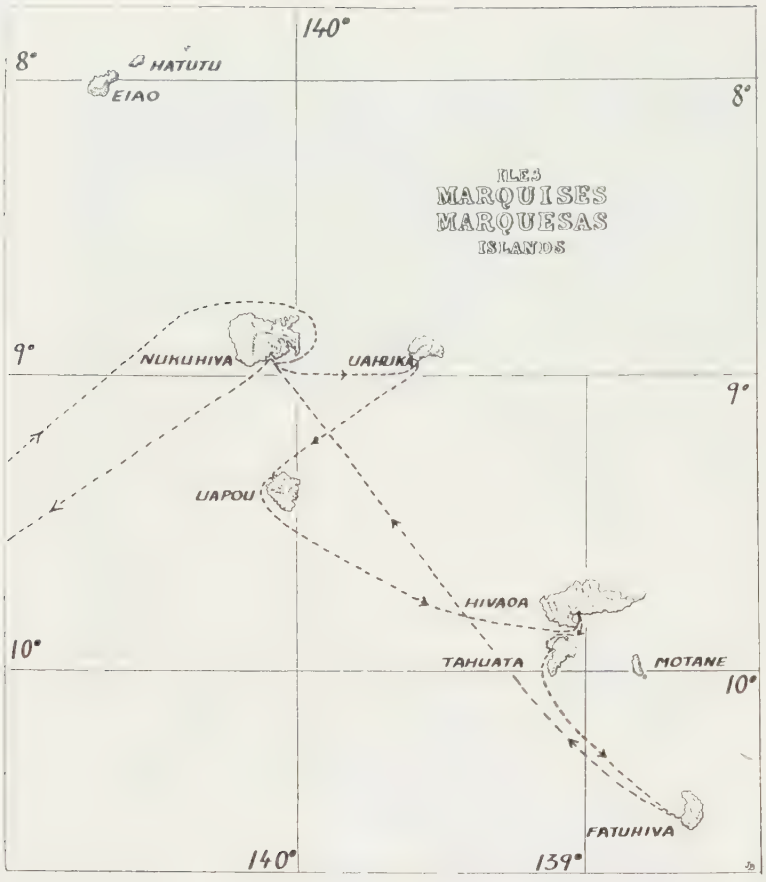


Map of the Marquesas Islands, showing route followed by the author on board the French naval escort vessel "La Confiance." Discovered in 1595 by an expedition organized by the Marquis de Mendoca, Viceroy of Peru, and named for the Marchioness, the Group was finally taken possession of by France in 1842.

Marquesas Journey

A thousand miles north-east of Tahiti lie the Marquesas Islands. Off regular shipping and air routes, they are seldom visited, and little is popularly known of them or their people. This makes of special interest the article below, written following a recent cruise through the Group by the author on board the French frigate La Confiance.

By JACQUES BARRAU*

WHEN on August 28 last I boarded the escort vessel "La Confiance" in Papeete, destination the Marquesas Islands, I shared some of the thrill of anticipation felt by Melville in 1842. He was then a seaman on the whaling ship "Acushnet" and was heading towards the same Group. This is what he writes in *Typee*:

> "Hurrah, my lads, it's a settled thing; next week we shape our course to the Marquesas! . . . I feel an irresistible curiosity to see those islands which the olden voyagers have so glowingly described. . . ."

Melville's visit took place more than a century ago, and I reflected that when introducing the new edition of Melville's book, in 1950, Gibbings wrote:

> "It is probable that in no other part of the world has the coming of the white man brought such disaster to a native people as in the Marquesas".

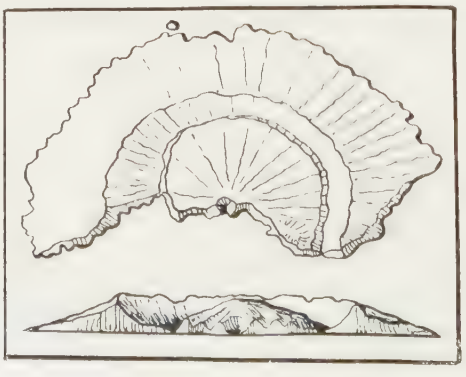
My enthusiasm was, therefore, mitigated by a somewhat anxious curiosity.

During the crossing I re-read Dr. Rollin's most interesting monograph on these islands. After three days spent at sea, during which we caught a glimpse of Ae, one of the atolls in the Tuamotu Group, we arrived at Nukuhiva of the rugged cliffs, the largest of the Marquesas Islands. Here Melville, who was then a deserter, spent several months.

Our stay in the Group lasted two weeks and we were able to call at the main islands. Although my visit was altogether too short, what I saw during that fortnight made me feel that the Marquesas and their problems should be better known.

Discovered In 1595

In 1595 the Marquis de Mendoca, Don Garcia Hurtedo, then Viceroy of Peru, launched a sailing expedition to explore the Pacific. Leader of the expedition was Alvaro Mendana de Neira, who sailed on the "San Hieronimo", commanded by Captain Fernando de Quiros. The expedition included three other ships, the "Santa Catalina", the "San Felipe" and the "Santa Isabella". They left Callao on 9 April 1595, and after sailing for three months and twelve days they sighted unknown islands which they named "Marquesas" in homage to the Marchioness de Mendoca. Their attempt to settle there was foiled through the violent hostility shown by the island people.



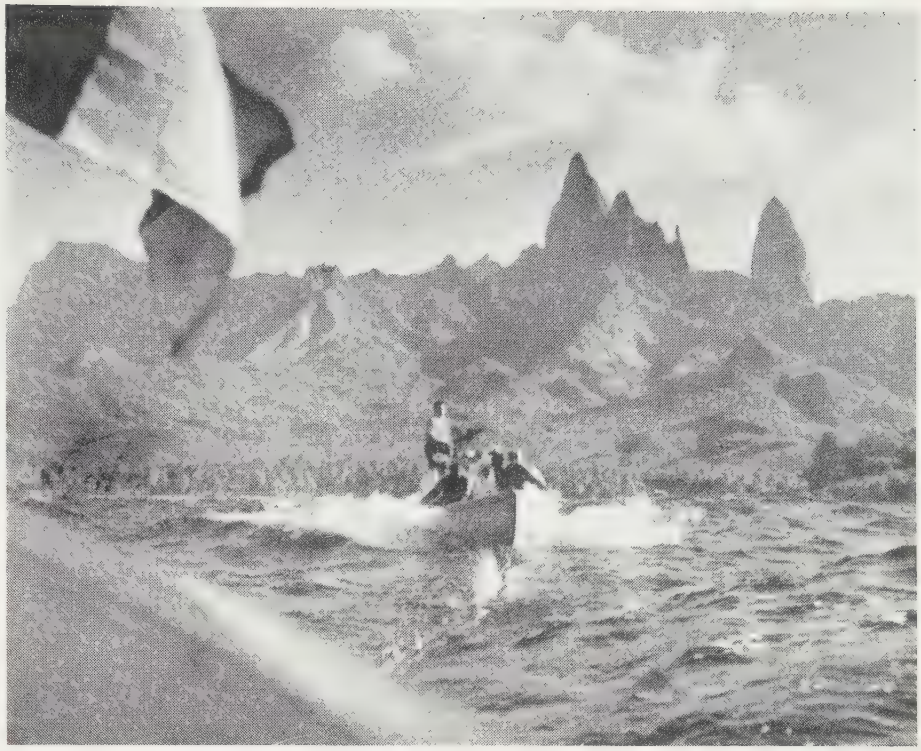
Author's sketch of Fatuhiva Island indicates volcanic origin of Group.

Captain Cook called at the Group in 1774, and in 1791 Captains Ingraham from Boston and Marchand from Marseilles discovered the northern part of the Group, followed by Hergest, who completed the exploration.

Soon whalers started visiting the islands, not—as we shall see later—to the advantage of the local population. In 1797, an attempt by the London Missions Society to Christianize the islands was unsuccessful. In 1804 the Russian explorer Krusenstern visited the Group, followed by an American, Captain Porter, who tried to settle in Nukuhiva in 1813, again without results.

Those were days of great adventure, and we are therefore not surprised to read that in 1835 the Marquesas were visited by a peculiar and imaginative Frenchman, the Baron de Thierry, who, having already styled himself "Sovereign

* Plant Introduction Officer, South Pacific Commission.



Typical Marquesan skyline. The sharply-serrated ranges and high peaks of Uapou Island.

Lord of New Zealand", added to his title that of "King of Nukuhiva" after his stay in the islands.

Finally, in 1842 Rear-Admiral Dupetit-Thouars officially raised the French flag over the Archipelago.

Of Volcanic Origin

The Marquesas are high islands of volcanic origin, lying between 7° and 11 south latitude and 138° and 141° west longitude. They include some ten islands with a total land area of approximately 400 square miles. They are mountainous, and the highest point, on the island of Hivaoa, reaches 3,750 feet. The coastlines are rugged, mostly with sheer cliffs falling into the sea. There are therefore very few anchorages safe in all weathers. Depths of 6,000 to 10,500 feet are found between some of the islands.

The volcanic origin of the Archipelago is clearly visible in the structure of most of the islands, as can be seen in the drawing opposite of Fatuhiva Island inspired by L. J. Chubb's work on the geology of the Archipelago (*Geology of the Marquesas Islands,* Bernice P. Bishop Museum, 1938).

The only flat areas are to be found in some of the larger valleys, great canyons gouged out of the mountains such as the Valley of Taipi-Vai on Nukuhiva, or else in deep bays along the coast such as Taioahe, again on Nukuhiva, or Atuona on Hivaoa.

The population, which is mostly Polynesian, numbered 3,800 in 1956. The only inhabited islands are Fatuhiva, Hivaoa, Nukuhiva, Tahuata, Uahuka and Uapou.

Natural History Note

In the whole of the Pacific complex the Marquesas constitute a unique entity. Geologically they differ from the other Polynesian archipelagos of volcanic origin in that their rock formations contain no nephelite (in this respect they are akin to the Galapagos and Juan-Fernandez Islands). They seem to be of much more ancient formation than the other Polynesian islands.

Basically they are composed of basaltic lava, tuff, scoria and conglomerates, but on Uapou there is also some phonolite, very dense and rich in sodium. A few sulphurous deposits and emanations, together with some mineral springs, are the only traces of past volcanic activity.

Curiously enough, coral formations are very rare along the coasts, where hardly any madreporic reefs are to be found. This may be partly due to the chance influence of the cold Peruvian current which may be felt as far as these waters.

With regard to the vegetation, it is noteworthy that the terrain between sea level and a height of 900 to 1500 feet, as well as drier areas even up to 1,400 feet, are characterized by an abundance of introduced species such as *Leucaena glauca,* and by plants common to the entire Pacific area such as *Hibiscus tiliaceus.*

The coastal vegetation is of the classical oceanian pattern, with arborescent species such as *Thespesia populnea* and *Cordia subcordata.* The valleys are crowded with coconut palms and breadfruit trees, *Artocarpus altilis,* which are the mainstay of the indigenous subsistence economy.

In many islands one finds at altitudes varying between 1,500 and 2,400 feet, vast grassy patches containing grami-

Above: Coastlines are rugged and steep-to, and safe anchorages are scarce. Right: Village on Fatuhiva Island. People of the Group are Polynesian.

Above: Stone carving, Hivaoa Island. Right: Over-grazing is the cause of serious erosion of Marquesas soils, as is apparent in this photograph taken on Ua pou Island.

naceae and ferns of the *Gleichenia* type. These represent the final stage of the severe degradation of the vegetation caused by man and animals introduced since the arrival of the white man. This degradation often goes hand in hand with bad soil erosion. From 2,100 or 2,400 feet right up to the summits there are fairly thick forests containing numerous epiphytes.

The indigenous flora includes some 250 species, some of which are found nowhere else. One of these is worth mentioning—a very beautiful palm tree, *Pelagodoxa henryana,* which was disdiscovered in 1916 in the Taipi Vai valley on Nukuhiva. The Marquesans call it "enu", or "vahane". Some good specimens may be seen in the Motuovini botanical gardens in the Papeari District of Tahiti, and also in the Suva botanical gardens in Fiji.

Also worthy of mention is a peculiar kind of cotton plant called *Gossypium tahitense* which existed in the islands even before the advent of the white man. It has brown fibres, and is fairly rare. It is still found on the island of Uahuka.

Finally, there is a kind of wild tobacco plant, *Nicotiana fragrans* var. *fatuhivensis,* which grows on Fatuhiva.

The Marquesan fauna proper includes, *inter alia,* eight species of lizards.

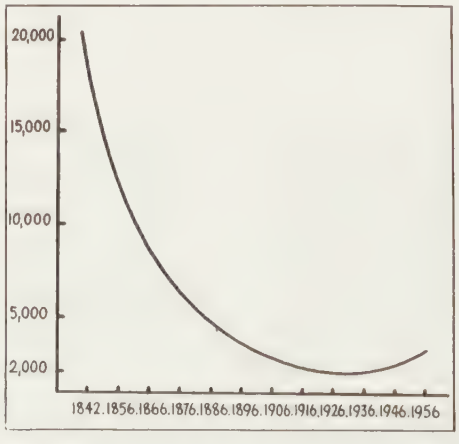
Among the birds, special mention must be made of the lovely blue budgerigar, *Coryphilus ultramarinus,* found only on Uapou; a large pigeon called "upe", *Serresius galeatus, Ptilopus* green pigeons, and the curious *Gallicolumba rubescens,* earth dwelling, and now only to be found in islands and localities where it has nothing to fear from man or dog.

Finally, among the insects, it is difficult to avoid mentioning the tiresome "nono", *Simulium* spp., which can be most annoying during a stay on Nukuhiva.

Unusual Climate

One climatic factor in the Marquesas appears to have been frequently overlooked. The Archipelago receives the benefit of the trade winds and should therefore be included, together with most of the other Polynesian islands, in the southern trade wind zone. In fact, however, the rainfall varies considerably, both in frequency and in quantity. Although in normal years it averages between 40″ and 60″, severe droughts do occur periodically. In 1949-50 some islands had only 7″ to 10″ of rain.

The islands experienced such droughts in 1909-1910, between 1918 and 1928, and again in 1931-1932, etc. G. Schott, in his *Klimatkunde der Sudsee inseln* (Berlin 1934), describes this type of climate as "equatorial dry". The zone in which it prevails lies along the Equator to Micronesia and includes the southern part of the Gilbert Islands.



Population of the Group, estimated at 20,000 in 1842, fell to 2,094 in 1926. Vigorous action by the French Administration, especially in the field of public health, arrested the decline. Two years ago the population numbered 3,800, and is still increasing steadily.

Because of these droughts, food has often been in short supply. Dr. Rollin relates that during one lean period between 1807 and 1812, 800 people sailed in dug-outs from Nukuhiva in the hope of discovering a more fortunate abode. I believe that this is one of the last examples of Polynesian migration. It may be an indication of the reasons which caused those of the past.

If under such climatic conditions the vegetation suffers continued or repeated degradation, it cannot recover. This, unfortunately, is what has happened in the Marquesas.

The People

The Marquesans are tall Polynesians with a fairly light complexion. Without exception, early European visitors to the islands praised the beauty of their inhabitants.

Marquesan art was undoubtedly one of the most interesting in Polynesia. The people carved stone, wood and bone, while their tattooing was remarkable. To this day the Marquesans derive a considerable income from carvings, especially in wood, which are sold in all the curio shops in Tahiti.

The language is typically Polynesian, although it differs slightly from the Tahitian. In this respect it is interesting to note that the local name for the breadfruit tree, "mei", is quite different from those normally used elsewhere in Polynesia. From Hawaii and Tahiti to the Samoa group and in Indo-Malaya, the tree is called "uru", "kuru", "ulu" and other similar names. On the other hand, "mei" is used in the Wallis and Futuna Islands in Western Polynesia and similar names designate the species in Micronesia.

The breadfruit was, and still is, the main local subsistence crop. Between harvests, the fruit was preserved in large pits where it fermented and turned into

A group of healthy Marquesan girls of Taipi Vai valley. The people, who are mainly of Polynesian origin, are tall and light complexioned.

a paste known as "popoi". There are at least thirty cultivated varieties of the species. The islanders also distinguish over twenty varieties of banana trees and about ten varieties of coconut palms. Taros and yams continue to be cultivated.

So important was the breadfruit tree in the life of the indigenous population that it caused bloodshed when Europeans first settled in the islands. Without asking leave to do so, some white men cut down breadfruit trees for building purposes, and this gave rise to considerable conflicts.

The whalers who came to the islands in the 19th century taught the islanders how to distill the sweet juice pressed from the roots of the "ti", *Cordyline fruticosa,* and also how to tap the coconut sap, or toddy. Thus alcoholism started its deadly work, accompanied, of course, by venereal disease and all the other illnesses which the white man brought in his wake.

In 1774 Cook estimated the population of the Archipelago at 50,000, but he may have been above the mark. In 1842 Dupetit-Thouars took a census which resulted in a figure of 20,000. In 1926 the total population of the islands had dropped to 2,094, a dire consequence of the moral and physical ills which followed the arrival of the Europeans.

Fortunately this tragic situation was met by vigorous action from the French Administration, particularly in the field of public health, and today there is a startling increase in population in some islands, particularly in Uapou. In 1956, the population of the islands numbered 3,800, an increase of 81% in twenty years.

Rural Economy In The Marquesas

Soon after the discovery of the islands the Europeans started introducing new cash crops such as maize, which the Spaniards had attempted to grow during their stay at the end of the sixteenth century. It appears also that, as in many other territories in the area, it was thought that stock breeding would help to improve local economic conditions.

In 1804 Adam Krusenstern presented the islanders with a couple of goats. Now they swarm on most islands. Horned cattle were introduced in 1831, horses in 1842, and donkeys in 1843. In some islands—Eiao in particular—commercial sheep breeding was attempted. There as elsewhere the venture was short-lived, but the animals, left to their own devices, reproduced freely and have caused untold damage to the soil and vegetation.

In these islands, where the climate is fairly dry and the vegetation degraded, many introduced plants have found conditions in which to thrive. This is particularly true of *Leucaena glauca,* which in some places grows into thick coppices. The Marquesans often complain about it, but in fact, however encroaching it may be, this leguminous plant affords effective protection to the soil and provides fodder for the hosts of introduced grass-eating animals, thus probably preventing them from further damaging other types of vegetation.

From an agriculturist's point of view, at least, it is rather odd to find that goats and similar beasts are protected, as shooting is subject to a miscellany of restrictive regulations. I believe that, at least as far as goats are concerned, shooting should be freed from all undue control.

Cash Crops

In the field of cash crops, it is interesting to note that cotton was grown from 1865 to 1914. The only cash crops which are still worth mentioning are coconuts for the manufacture of copra, vanilla, and coffee.

In 1928, 1,800 tons of copra, 10 tons of green vanilla and 2 tons of coffee were exported.

Two of these crops are increasing considerably, as witness the fact that over 2,500 tons of copra and up to 150 tons of coffee per year were exported in 1955 and 1956. It seems therefore that development efforts should at present be concentrated on these.

In the Marquesas, conditions are satisfactory for *Arabica* coffee. In his excellent survey on rural economy in French Polynesia, M. Guillaume estimated that it should be possible to plant to coffee up to four times the area already devoted to that crop in the Archipelago.

In respect of coconut cultivation in the Group, the main tasks are the rejuvenation of groves by replanting, and the improvement of copra quality. Rats cause great damage to plantations, but control of this pest is under way. There can be no doubt that this will improve copra production as it has already done in other islands in French Polynesia.

Apart from these two main crops, vanilla might also be encouraged, as this plant is already established in the Archipelago and is exported by French Polynesia, which produced 187 tons in 1957.

Indigenous Arts

The importance of indigenous art in the Marquesas should also be given consideration. I have already mentioned carvings, but wood—or at least the finer species—is becoming rare. It is untimely to think in terms of ambitious reafforestation projects, but it should be possible to replant some of the species most appreciated for the grain of their wood. On the main islands small nurseries could be established where the Marquesans could obtain seedlings. Such a project would not be very costly but could be made to work efficiently, especially if it were backed by propaganda and administrative measures designed to encourage such replanting.

It also seems that wood carvers could organize themselves into a co-operative society which would enable them to sell their work on the Tahitian market under much better conditions than at present.

While considering woods and trees, attention should be drawn to sandalwood, several species of which grow in the Marquesas. It might be possible to develop better usage of these trees, to devise a planting programme and, possibly, to introduce other species better known for their commercial value capable of adapting themselves to the local climate.

(Continued on page 35)

Pearl Shell Investigation In The Cook Islands

A sailing canoe on Manihiki Lagoon. It is typical of dozens of pearling craft used by skin divers in the Cook Group.

In the past ten years pearl shell to a total value of £850,000 has been exported from the Cook Islands. A practical investigation is now in progress there, with the main objectives of protecting and expanding this valuable industry.

By J. L. NOAKES*

A PRACTICAL investigation into the pearl shell fishery of the Cook Islands is now in progress. It is being undertaken by Mr. Ronald Powell, Fishery Officer, Cook Islands, who has supplied the information and photographs for this account of his work.

It is not definitely known when the fishery commenced, but it is generally associated with George Ellis, an English boat-builder who settled in Manihiki Island of the Cook Group and owned a fleet of small cutters about 80 years ago.

Manihiki Island, a small lagoon atoll of about 1344 acres, has always been the centre of the Cook Islands pearl shell fishery and has always yielded the greatest returns. The lagoons of Penrhyn and Suwarrow Islands have also been worked, but with less success. Recently shell was planted in the lagoons of Pukapuka, Rakahanga and Palmerston Islands. This work will be described later.

Since 1948, the total value of pearl shell exported from the Cook Islands has been about £850,000, most of it being purchased in the United States. The price has risen from £100 a ton in 1945 to a maximum of £1000 with irregular variations. The present price is about £500 a ton.

Limits Of Local Knowledge

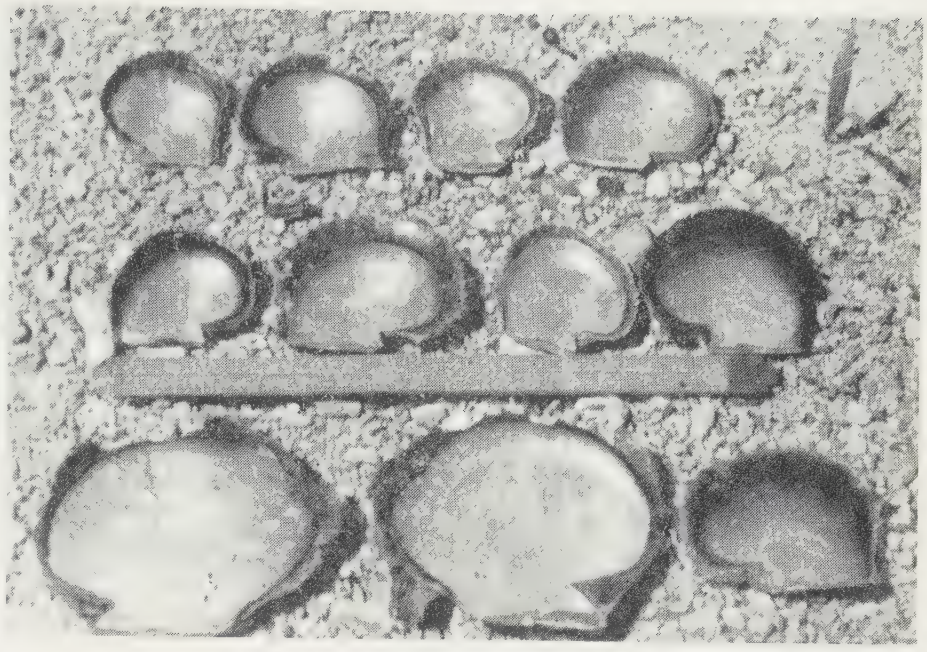
Little is known of the ecology of the pearl shell areas or of the limiting conditions of growth and possible failure of the natural stock from disease. Previously nothing was put back into research to safeguard the stock from disease and over-exploitation, and no replanting was done. The only control enforced was—and still is—in the form of rest periods for those lagoons appearing to have reached the point of depletion, and by limitation in the size of shell collected and exported. The minimum size at present is five inches.

Some of the questions it is desirable should be answered by scientific investigation are:—

What are the optimum conditions of growth in Cook Islands lagoons? This question must include investigations into the food of the pearl shell oyster, the depth at which the oyster grows best, the most suitable salinity of sea water, temperature limits, natural predators

The raft for the experiment, made from sawn timber and galvanized iron oil drums, all suitably processed to withstand the action of salt water.

* This article was prepared by Mr. Noakes, Director of Social Development, Cook Islands, in collaboration with Mr. Ronald Powell, Fisheries Officer. Mr. Powell attended the SPC-FAO Fisheries Training Course held at Commission headquarters two years ago, and was appointed to his present post on his return to the Cook Islands.



Commercial pearl shell taken from Manihiki Lagoon. Note variations in shape.

and suitability of varying lagoon bottoms for settlement.

What are the conditions governing maturity of the oyster? This question includes investigation into the size at which the shell is sexually mature, the seasons of the year in relation to optimum spat fall, the minimum size of shell to be picked to ensure that the remaining stock survives and multiplies, the size of a colony necessary to ensure multiplication, and the limits a colony can reach before ceasing to multiply.

What are the diseases likely to affect growth of the oyster and how can they be controlled? Little is known in the Cook Islands about such diseases, although one disease at present in Manihiki Lagoon seems to be what Hornell describes as "yellow disease", caused by the overcrowding of shells on natural rock bottom.

The two main hazards appear to be disease and hurricanes. The first—already mentioned—may be held in check and perhaps even eliminated with better knowledge. Probably nothing can be done to protect the fishery from hurricanes, but these are hazards which apply to every other primary industry in the Cook Islands.

Mr. van Pel of the South Pacific Commission transplanted some pearl shell from Manihiki to Rakahanga Lagoon in 1955, and in 1956 Mr. Powell added some more. Also in 1956 Mr. Powell transferred shell to Pukapuka Lagoon, and in 1957, he did the same in Palmerston Lagoon.

In every case the transplantation was successful and the shells are showing satisfactory growth rate, but it is still too early to express an opinion on reproduction.

If shell grows in these new areas but does not form colonies, then it is likely, other ecological conditions being suitable—that the lagoons have not sufficient clean bare rock for the attachment of young spat when it is ready to fall, because it is known that there is enormous competition for suitable bottom among coral sponges alone. This, it is thought, is the main reason why pearl shell has not grown naturally before in these lagoons, and not so much because of lack of foodstuffs, unfavourable water temperature, the presence of predators, and so on. Yet all this only goes to show the need for scientific investigation.

Fisheries Assistant Ioapa Marsters holding a young pearl shell, the first to appear from the transplantation to Rakahanga Lagoon made in 1955 by Mr. van Pel, SPC fisheries officer.

Survey And Investigation At Manihiki

It was decided to commence a preliminary survey and investigation to collect data, and plans were made to do this work in Manihiki Lagoon. Experiments were carried out between May and June, 1958, these months being the most suitable for the purpose.

It is standard procedure, in surveys of this type, to create artificial conditions to facilitate observation of the pearl shell over a suitable period. The best way is to construct a strong, serviceable raft, moor it firmly in a suitable place in the lagoon, suspend "collectors" from it at varying depths in the sea water, and provide means to ensure that oyster spat is made available under natural conditions for the collectors. Observations are made from time to time, and in this way scientific data is obtained.

Pre-cut timber and galvanized iron oil drums were assembled in Rarotonga and taken to Manihiki, where the raft was built on the water's edge. Fifty men from the village made light work of the launching, and the only motor launch on the island towed it out to a pre-arranged site where it was firmly moored with iron chains to a large coral head near the lagoon bottom.

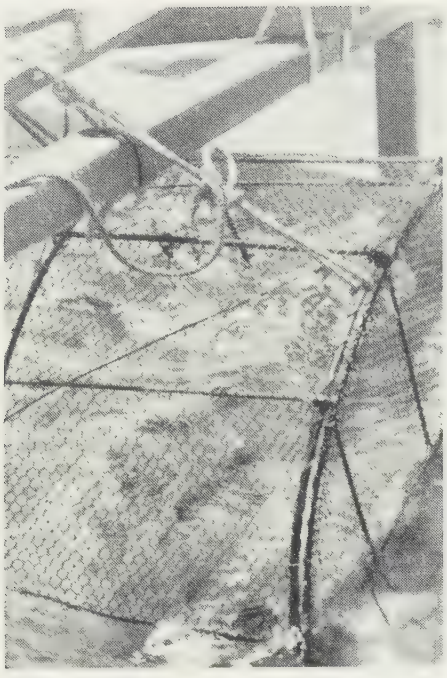
Three kinds of collectors were prepared and suspended at varying depths below the raft using stainless steel wire, and a fourth kind was placed on the lagoon bottom below the raft.

The first suspended type was made of sheets of Durabestos, one foot square, grouped into frames. There were two frames each of ten squares, one of eight, one of six and one of two.

The second suspended type of collector was made by lacing together three sheets of expanded metal (three sheets, because no single sheet could be obtained with apertures sufficiently small) suitably treated—as was everything else used—to resist salt water.

The third suspended type of collector was a chain of thirty-six paua shells strung on a stainless steel wire and separated one from another by means of bamboo and lead.

In order to ensure the presence of oyster spat, three wire frame cages were



Left: A wire frame cage containing live pearl shell graded for size. It is being transferred by canoe to the raft site. Note that the live shells are kept below the surface of the water. Above: One of the three sheets of expanded metal which were laced together and suspended from the bottom of the raft to act as a spat collector.

made, 3′ x 4½′ x 2½′, and covered with fine mesh wire, a door occupying one end of each. Live pearl shells were then collected and graded. Shells 2″ across were placed in the first cage, 3″ across in the second, and 4″ across in the third. These cages were placed on the lagoon bottom below the raft.

As well as providing spat, it will be possible to check the growth rate of the live shells from time to time by examining the contents of the cages.

The fourth type of collector—cement tiles—was placed in the lagoon below the raft, starting at three fathoms on coral heads and going down to eight fathoms.

Probably it will be several years before the full results can be assessed of the experiment now under way. Observations will be necessary at fixed intervals, and great patience and care must be exercised to obtain the best results.

Mr. Powell carried out other tests and made other examinations in Manihiki lagoon. As a result he expressed the opinion that without doubt the lagoon had been fished down to a very low level and it would be unwise to do any heavy fishing in it again for at least another year. He considers the Lagoon must be well covered and a much heavier settlement of young shell found again before it will be safe to say that the shell population is high enough to start intensive fishing.

LOW-INCOME HOUSING IN FIJI

Low-Income Housing is the title of a report on a visit to investigate low-cost housing schemes, made to the West Indies early in 1958 by Mr. K. R. Bain, Secretary of the Fiji Housing Authority, which was set up in January, 1957, to provide homes for workers in low income groups.

The report is divided into six parts: I—The Background; II—Housing in the West Indies; III—Regional Housing Organization; IV—Aided Self-Help Housing; V—Building Societies; VI—Fiji: Recommendations for Low Income Housing Policy.

Some of the recommendations in the last part are already being implemented by the Housing Authority, which is now engaged in carrying out a construction programme on an area of 43 acres of Crown land in Suva.

Though prepared for Fiji, Mr. Bain's report contains much of value for those working in his field in other territories.

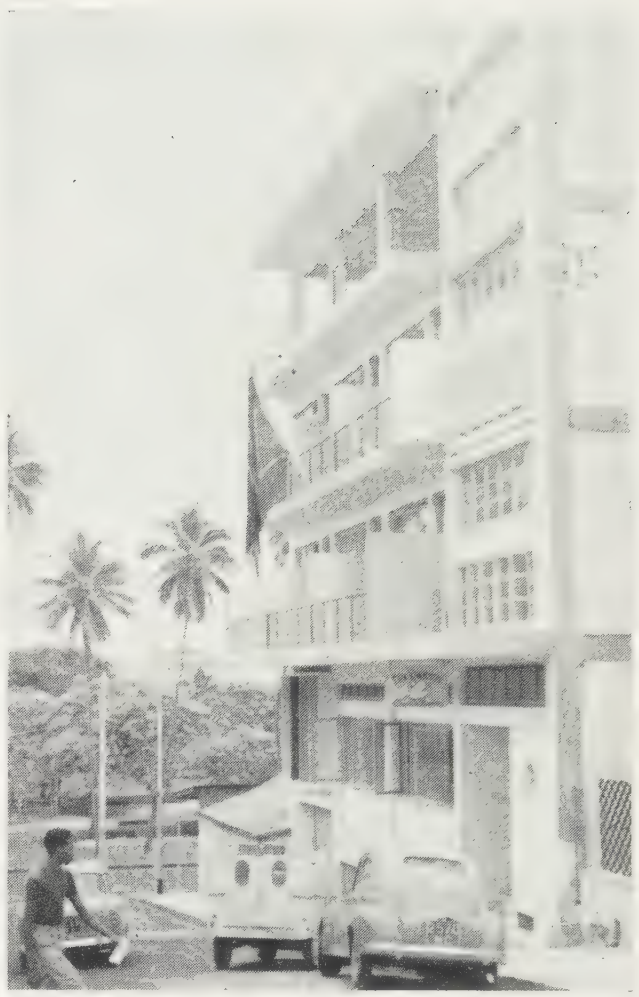
LOW-INCOME HOUSING: Report of a visit to the West Indies to Investigate Housing Scheme for Wage-earners in the Low Income Group, January-March, 1958. By K. R. Bain. Legislative Council of Fiji: Council Paper No. 12 of 1958. Government Press, Suva. Price 2/6.

Squares of asbestos wallboard spaced with bamboo and lead and grouped into racks as spat collectors.

Bright Future For Tourism In New Caledonia

A French colony peopled by an intriguing mixture of races — European, Asiatic and Pacific — New Caledonia holds abundant attractions for the tourist. Vigorous efforts now being made to develop the island's tourist industry have already brought highly encouraging results.

By E. J. E. LEFORT*



Holiday Apartments, a block of modern, well-appointed service flats overlooking historic Coconut Square in the heart of Noumea, provide an excellent illustration of the efforts now being made to develop New Caledonia's tourist industry.

THE development of travel in the South Pacific is, for many islands in the area, creating the possibility of a new industry for which they are admirably suited, namely tourism. Up to now Fiji has been the only territory to take advantage of this new trend. Following this example New Caledonia is making praiseworthy efforts to enter the new field.

New Caledonia is richly endowed for tourism but unfortunately does not as yet possess the necessary facilities for exploiting its natural beauties. This lack has been recognized by the authorities, and in 1955 and 1956 two agencies, the *Caisse du Tourisme* and the *Office du Tourisme*, were set up to promote and encourage the development of the tourist and hotel industries. A Visitors' Bureau has been in operation for some time and the *Crédit de la Nouvelle-Calédonie* is allowed to lend money towards the building of hotels.

In 1957, the *Caisse du Tourisme* paid out, or allocated, 4,825,000 Pacific francs and the *Crédit de la Nouvelle-Calédonie* issued 4.5 million Pacific francs on loan. (£stg.1 = 248.75 Pac. frs.)

Finance For Building Hotels

It is of interest to outline the policy with respect to hotel building. Provided the project is worth while, the *Crédit de la Nouvelle-Calédonie* or the *Caisse du Tourisme* will loan up to 30 or, in special cases, even 50% of the total estimate. The interest on the loan is paid by the *Caisse du Tourisme* and the *Office du Tourisme* gives technical assistance, and in certain special cases the *Caisse du Tourisme* makes good the losses incurred during the first years of operation.

This policy has given an appreciable boost to the development of hotel facilities in New Caledonia. At the end of 1956 there were only seventy-four first-class bedrooms in Noumea, whereas there are now 155, including fifteen

(Continued on page 70)

On the Isle of Pines, south of New Caledonia, this recently-built communal dining room, lounge and bar serves surrounding cabins. A local airline now runs three flights a week to the island from Noumea.

* Last month M. Lefort concluded a five-year tour of duty with the South Pacific Commission as Economic Development Officer, and has since returned to France.

SPC Conference On Tuberculosis In Pacific

A conference to study the problems and possibilities of tuberculosis control and eradication in Pacific territories was held in American Samoa under South Pacific Commission auspices last November. It was attended by nineteen tuberculosis and public health officers from thirteen Pacific territories, and, as consultants, by four specialists from the United Kingdom, France, Australia, and Hawaii.

By EMILE MASSAL*

Conference group photographed outside the Administration hospital at Pago Pago.

ON 10 November 1958 the Honourable Peter Tali Coleman, Governor of American Samoa, presided at the opening session of the Conference on Tuberculosis in Pago Pago. It was at his invitation that the South Pacific Commission held the Conference in this territory.

The formal opening of the Conference was marked by a traditional and colourful Samoan Kava ceremony attended by High Chiefs, Government officials and a large representation of the people of American Samoa who in this way greeted and welcomed the delegates as their guests.

In reply to expressions of appreciation offered by Dr. Emile Massal on behalf of the South Pacific Commission and the twenty-five participants, Governor Coleman said:

"On behalf of the people, leaders, and Government of American Samoa, it is my privilege to welcome officially to American Samoa the delegates and consultants of the South Pacific Conference on Tuberculosis.

"This conference is the first medical meeting of its kind ever held in this territory. We are proud of this singular honor. Even though the study on tuberculosis has long been carried out in other areas, your coming here for this conference is significant. The Samoan leaders and people by tradition have recognized the importance of free exchange of opinions through their conferences to the end of solving problems.

"It is indeed a privilege and pleasure to be the host territory to this conference. We are also proud of your purpose to serve mankind. For according to our tradition, we believe as you do that the destiny of man to be fully satisfying lies in being of service to others. No government or philosophy has even lastingly endured unless it was based on a service motive for bettering mankind. No man or association of men however rich, powerful, or well-informed, can make a proper contribution to society unless his or its life is built around serving

* Executive Officer for Health, South Pacific Commission.

An informal discussion. Left to right: Dr. Wilfred Jones, Dr. Emile Massal, Professor F. R. G. Heaf, Dr. J. C. Thieme, Dr. G. D. Murphy.

others. Knowing that it is for this purpose or service that the South Pacific Commission exists and to which also this conference is dedicated, I must commend you to your task.

"I hope you will find your stay here stimulating and enjoyable. Our facilities, limited as they may be, are at your disposal for a successful conclusion.

"Ladies and gentlemen, the tuberculosis afflicted of the South Pacifiic territorial areas look upon you with high hopes. It is with this thought that I humbly and proudly declare this South Pacific Conference on Tuberculosis officially open. May the Holy Spirit guide you in your work. *Soifua!*"

The work of the Conference started immediately under the chairmanship of Dr. John Kennedy, Director of Medical Services, American Samoa, and continued until 20 November.

Theme Of Conference

The theme of the Conference was the consideration of tuberculosis as a community disease in the South Pacific. The Commission did not desire to organize a course on tuberculosis but rather to assemble a group of medical practitioners qualified to consider the best means of reducing the prevalence of the disease in the area, the possibility of eradicating it completely in certain communities and of preventing its spread to communities as yet free from infection. Participants were asked to discuss these questions bearing in mind the present economic and social conditions and trends, whose existence and development concern and influence the epidemiology of tuberculosis.

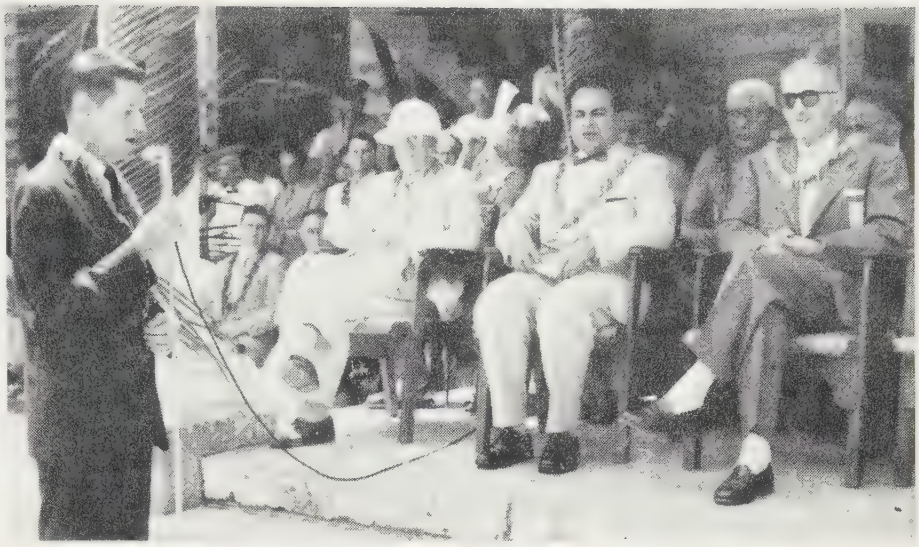
Four Aspects Proposed For Consideration

It was proposed to the participants that the subject should be considered from four aspects:

1. Aims and purposes of a community control programme in tuberculosis.
2. The epidemiology of tuberculosis and its significance in community control.
3. Aspects of case management and contact control in the protection of the community against tuberculosis.
4. Methods and techniques in diagnosis. Prevention (including inoculations) and treatment.

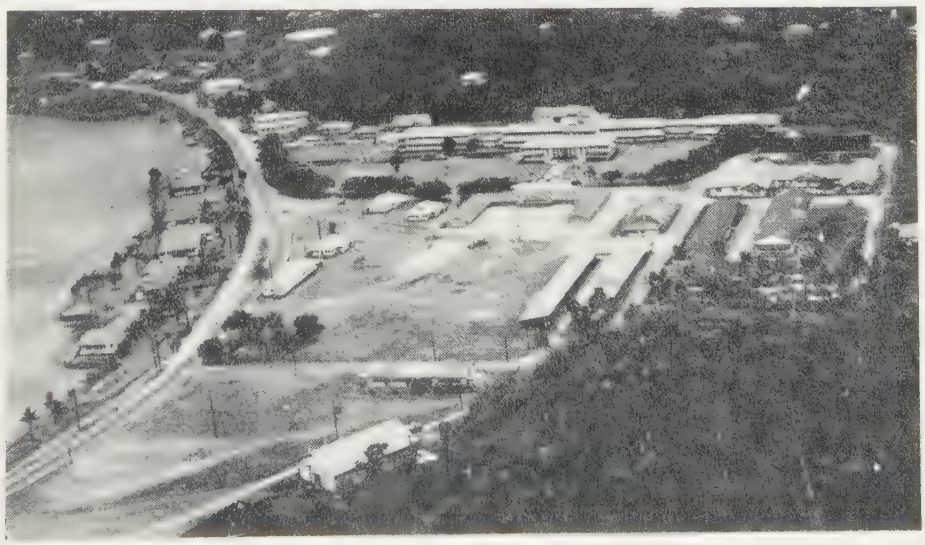
Conference Participants

The thirteen territories which had accepted the Commission's invitation to attend were represented by nineteen delegates who were either officers directly responsible for tuberculosis or pub-



Dr. John E. Kennedy, Director of Medical Services in American Samoa, addresses the gathering at the opening ceremony. Seated (centre) is the Hon. Peter T. Coleman, Governor of American Samoa, who presided. On his right is Judge Arthur Morrow, while on his left is Dr. Emile Massal, Executive Officer for Health, South Pacific Commission.

Conference participants listen to an address at the Administration hospital which, in the aerial view of Pago Pago below, is the large building in the centre background.



SPC TUBERCULOSIS CONFERENCE: List of Participants

Dr. Ellis W. **ABRAHAMS**, Director of Tuberculosis, Brisbane, Queensland, Australia. (Consultant.)

Dr. (Mrs.) Andrea **DE BALMANN-TOURNEUX**, Public Health Department, Papeete, Tahiti.

Dr. William A. **CONOVER**, Assistant Director of Public Health, Trust Territory of the Pacific Islands, Agana, Guam.

Professor F. R. G. **HEAF**, C.M.G., F.R.C.P., Welsh National School of Medicine, 4 Richmond Road, Cardiff, Wales, United Kingdom. (Consultant.)

Dr. J. S. **HOGG**, Senior Medical Officer, Tarawa, Gilbert and Ellice Islands Colony.

Dr. Wilfred M. G. **JONES**, Chief of Tuberculosis and Chest Services, Department of Medical Services, Pago Pago, American Samoa.

Dr. John E. **KENNEDY**, Director of Medical Services, Pago Pago, American Samoa.

Dr. J. **LAIGRET**, Director of the Institute of Medical Research of French Polynesia, Papeete, Tahiti.

Dr. J. **LALOUEL**, Chief of the Tuberculosis Service, Gaston Bourret Hospital, Noumea, New Caledonia.

Dr. Thos. C. **LONIE**, Public Health Officer, South Pacific Commission, Noumea, New Caledonia.

Dr. J. D. **MACGREGOR**, Senior Medical Officer, Honiara, British Solomon Islands Protectorate.

Monsieur le Professeur Agrege R. **MANDE**, 12 Rue Decamps, Paris 16e France. (Consultant.)

Dr. E. **MASSAL**, Executive Officer for Health, South Pacific Commission, Noumea, New Caledonia.

Dr. G. D. **MURPHY**, Medical Officer-in-Charge, Tamavua Hospital, Tamavua, Fiji.

Medical Practitioner Francisco **PALACIOS**, Saipan District Hospital, Saipan, Trust Territory of the Pacific Islands.

Dr. Knud Normann **PETERSEN**, Chief of Tuberculosis Service, Department of Medical Services, Agana, Guam.

Dr. L. O. **ROBERTS**, Adviser on Tuberculosis, Western Pacific Regional Office of the World Health Organization, Manila, Philippines. (Observer.)

Dr. H. S. **SCHNEIDER**, Civil Medical Officer, Public Health Service, Tuberculosis Control, Hollandia-Binnen, Netherlands New Guinea.

Assistant Medical Officer Manea **TAMARUA**, Officer-in-charge of Tuberculosis Sanatorium, Rarotonga, Cook Islands.

Dr. J. C. **THIEME**, Medical Officer-in-Charge of Tuberculosis Control, Health Department, Apia, Western Samoa.

Assistant Medical Officer Sateki **TUPOU**, Member of Tuberculosis Control Team, Vaiola Hospital, Nuku'alofa, Tonga.

Dr. M. **TIVOLLIER**, Minister of Health, Labour and Social Affairs, Noumea, New Caledonia.

Dr. Hastings H. **WALKER**, Director, Leahi Hospital, 3675 Kilauea Ave., Honolulu 16, Hawaii. (Consultant.)

Dr. S. C. **WIGLEY**, Specialist Medical Officer, (Tuberculosis), Department of Public Health, Port Moresby, Papua and New Guinea.

Dr. G. **WIJSMULLER**, Chief, Division for Tuberculosis Control, Department of Public Health, Hollandia-Binnen, Netherlands New Guinea.

Dr. H. N. **WHITE**, Acting Assistant Director (Preventive Medicine), Department of Public Health, Port Moresby, Papua and New Guinea.

lic health administrators in their respective territories.

Four metropolitan specialists contributed to the debates, and the World Health Organization was represented by the Adviser on Tuberculosis of its Western Pacific Regional Office, who acted as observer.

The Executive Officer for Health and the Public Health Officer of the South Pacific Commission completed the group and, with the aid of members of the Commission and Territorial Public Health staff, were responsible for the administrative and clerical work of the Conference.

Background Documentation

A collection of documents had been circulated to participants prior to the opening of the Conference. They were reports on tuberculosis in the territories of the South Pacific, introductory papers to the topics under consideration prepared by the metropolitan specialists, and a short analytical bibliography on tuberculosis in the Pacific. Participants had, therefore, already studied these background papers, and this obviated the necessity for lengthy statements and speeded up the business of the Conference. The value of this preparatory work was acknowledged by all, and the participants expressed the wish that these documents should be published and circulated by the South Pacific Commission.

Working Procedures

At the preliminary meeting the Conference laid down the detail of its programme and also its method of working. In effect each topic was introduced briefly by a metropolitan specialist, discussed first by a small panel under the guidance of a "moderator", then thrown open for general discussion.

The Conference appointed a Steering Committee of five members who were responsible for ensuring the implementation of the programme, preparing and submitting a draft report to the Conference and co-ordinating discussion and social activities.

As this article is necessarily limited in length, it is not possible to reproduce the debates in detail. Discussion was often very animated but always courteous, all participants were able to describe freely the results of their work and express their opinions. The report which will be circulated by the Commission shortly represents the agreed views of the Conference. Its more technical aspects will not be reproduced in this article whose main object is to draw the attention of readers to the problems of tuberculosis and to the part which they may be able to play in controlling the disease.

Main Conference Findings

The Conference considered that while the eradication of tuberculosis is desirable, it is not feasible except possibly in some small isolated communities. Consequently, the aim of any programme for the prevention of tuberculosis should be to control the disease, to reduce its prevalence to such a level that the disease ceases to be a serious threat to the health of the communities, and to prevent its introduction into those communities where it does not at present exist. The Conference recognized that these aims can be substantially promoted by the desire of the communities to participate actively in the tuberculosis control programme.

In spite of the lack of complete and valid data on the epidemiology of tuberculosis in the communities of the South Pacific area, the Conference recognized that disease patterns vary considerably in different areas. The members discussed the causes of these variations, particularly the facilities for, and the methods of case finding, the establishment of statistical records, the methods of transmission of the disease, the part played by racial resistance, environmental circumstances, and the level of education of the people.

The Conference considered that it was imperative to undertake valid epidemiological studies by proved and, if possible, standardized methods in order to determine the magnitude and the nature of the problems involved. Such studies should aim at defining the present position, the knowledge of which will permit of the working out of a control programme and later of an evaluation of results achieved.

Bovine tuberculosis should be dealt with where it exists, and protection provided for uninfected herds.

The relation between the existence and spread of tuberculosis and various environmental circumstances (housing, diet and nutrition, customs, ways of life, etc.) should be studied carefully and

(Continued on page 65)

Above: Cocoa seedlings in the departmental nursery at Koronivia. The seedlings are issued after they have flushed twice. Right: Field workers at Nadururloulou with a selection of cocoa pods after harvesting.

Fiji Harvests First Cocoa Crop

Fiji's first cocoa crop was recently harvested from trees planted in 1953 and 1954 as part of a Department of Agriculture campaign to diversify an economy mainly dependent on sugar and coconut products. Results have shown that conditions in Fiji are most suitable for cocoa, and prospects seem bright for the rapid development of a large and profitable industry.

By L. W. HARWOOD*

DURING the past five years considerable attention has been devoted to the establishment and development of a cocoa industry in Fiji. For some time it has been obvious that additional crops, especially those which yield produce of a non-perishable nature, have been required to augment and diversify Fiji's economy. The early settlers in the Colony, especially those in remote and isolated areas, saw that cocoa might be a crop which would overcome their storage and transport problems and provide a steady and reliable income. The work they did has contributed appreciably to the recent developments.

Mr. J. B. Thurston[1] (later Governor) introduced the first cocoa to Fiji about 1880. Seeds of these trees, which were of two types described as Five Grooved Yellow Prolific and Sangre Toro, were distributed throughout the Colony. Excellent drawings of these original introductions enable them to be classified as Forastero, type Amelonado and Criollo, respectively. During the course of a survey of surviving trees, survivors of these original introductions were found growing in the jungle on Sir John Thurston's former property on the island of Taveuni.

Further introductions of pods from India, Singapore, Java, and Western Samoa were made by the Department of Agriculture between 1905 and 1909. Approximately 200 acres of cocoa were planted on the islands of Viti Levu, Vanua Levu, and Taveuni. Cocoa production was apparently abandoned after a very severe hurricane in 1912, although poor communications and low prices possibly contributed to its abandonment.

There was a revival of interest during World War II. M. D. ffrench-Mullen,[2] who had some experience of cocoa in the West Indies, carried out a preliminary survey of surviving trees on Vanua Levu and Taveuni. This survey proved of particular value when the re-establishment of the industry was mooted.

In 1944 Shephard[3] recommended that the possibility of re-establishment of the industry in Fiji should be thoroughly examined, and that rooted cuttings of the best Imperial College Selections should be introduced to provide the necessary planting material.

Patterson and Dodds[4] endorsed Shephard's recommendations. They considered that the industry, if developed, would provide a valuable alternative crop for outlying districts which were virtually dependent on bananas.

Since 1948, introductions of selected clonal material from Trinidad, Papua-New Guinea, Western Samoa and Grenada, and seed from Papua-New Guinea and Western Samoa have been established at the plant introduction and quarantine station, Nadururloulou. These and seedlings of local material which had been planted at Nadururloulou some years before provided a valuable nucleus of planting material.

Urquhart's[5] visit to the Colony in 1952 provided the impetus which was required. An acknowledged authority, he had no doubts that the climatic and soil conditions were very suitable for the development of a cocoa industry. He considered that large tracts of suitable land were available on Viti Levu, and that further areas should be obtainable on islands such as Vanua Levu and Taveuni. He suggested that cocoa would be a suitable crop for Fijian farmers, and would fit in with their system of farming.

Following Urquhart's encouraging report a special committee recommended that cocoa be developed, as a matter of urgency.

At the time Shephard[3] made his recommendations, it was envisaged that high-yielding selections would be introduced from Trinidad and that these would be multiplied for bulk distribution. The multiplication of suitable ICS. clones would have postponed the planting up of a significant area of cocoa for three to four years. It was therefore decided to distribute seedlings of local near-Forastero material which would be obtained from survivors of earlier plantings.

* Senior Agricultural Officer (Cocoa), Department of Agriculture, Fiji.

Above: Cocoa nursery at Naduruloulou, with vegetative propagators in background. Right: Vegetative propagation at cocoa station at Naduruloulou. Cuttings are being raised for clonal nurseries and seed gardens.

Survey Of Existing Cocoa

A survey of existing cocoa was commenced in 1954. To date, over five thousand trees in various parts of the Group have been located, rehabilitated and pruned. Each tree has been labelled with a distinguishing metal number. Pods have been regularly collected for classification and propagation since the inception of the survey. Careful records of yields have been maintained since 1954.

As the survey progressed, it became apparent that a good nucleus of high-yielding trees of the desired type was available.

The completion of the aerial and reconnaissance soil surveys of Viti Levu, which were followed by more detailed soil surveys of Viti Levu, Vanua Levu and Taveuni, confirmed Urquhart's suggestion that large areas of cocoa land existed in Fiji. The preparation of maps of the potential cocoa soils of the larger islands showed that a minimum of 170,000 acres of land eminently suitable for cocoa, and a further 280,000 acres worthy of further investigation, is available on Viti Levu, Vanua Levu and Taveuni. Suitable land is also known to exist in islands such as Kadavu, Koro, Gau and some of the smaller islands.

Planned Development

The accumulation of this necessary basic information on soils allowed of planned development.

Experience in other parts of the world, especially the British West Indies, has shown that cocoa does not flourish on unsuitable soils. Any development, especially in a new area, should be planned.

In order to ensure that cocoa was planted on soils suitable to the crop, a system of registration was instituted from the inception of the development programme. All applicants to plant cocoa are provisionally registered until their land has been inspected and their applications approved.

Initial development has been restricted to the islands of Viti Levu, Vanua Levu and Taveuni. This was necessary because little was known of the soils of other areas, and also because the bulk of the Department's extension staff was concentrated on these islands

Plans are now in hand for the extension of planting to suitable islands in the Lomaiviti Group and Kadavu. This has been made possible by the completion of the soil survey which revealed the presence of suitable cocoa land in these comparatively undeveloped areas.

In order to ensure reasonably close supervision, and more particularly that the area planted in any one locality would be sufficiently large to allow of co-operative fermentation and drying, no plantings in any area were encouraged unless a minimum of ten acres, or preferably thirty acres, could be guaranteed.

It was further decided that plantings by individual small farmers be restricted to three acres during the early stages of development. From the outset it has been realized that concentration of plantings was essential to ensure proper supervision, and to ensure the production of a marketable commodity.

Free Issue Of Seedlings

Six hundred seedlings grouped as closely for strain as possible, and the necessary shade trees, are issued free of charge to any registered grower whose land has been prepared to the satisfaction of the Department of Agriculture. Additional seedlings and rooted cuttings may be provided at reasonable prices. These seedlings are issued from Departmental nurseries on Viti Levu, Vanua Levu and Taveuni.

Since 1954 progress has been rapid and encouraging. To date 1387 farmers of all races in various parts of the Group have registered to plant a total of 4313 acres. (It should be noted that the acreage registered is not a true indication of the degree of interest shown because of the decision to restrict plantings to the main islands).

Sufficient seedlings to plant 1695 acres of cocoa have been issued. Now that increased supplies of planting material are available the number of seedling nurseries is being increased and the planting rate accelerated. During the present planting season 55,000 seedlings have been issued to farmers, while a further 95,000 are being raised in

Clonal nursery at Naduruloulou. The best local and introduced selections are established here under shade trees. These shade trees have just been lopped.

Above: Glenudia masculata trees used at Naduruloulou cocoa station for shade trees. Right: A young plantation planted in 1954 coming into bearing.

nurseries. It is hoped to issue a total of 250,000 seedlings during the present planting season. As anticipated by Urquhart, the Fijian people have shown keen and sustained interest and are responsible for the bulk of the plantings. Increased interest is being shown by farmers of other races.

In pursuance of the Department of Agriculture's policy of establishing a minimum of ten acres in a district, 41 such areas have been established. During 1956 and 1957 a local company with plantation interests inter-planted 220 acres of mature coconuts with seedling cocoa. The planting material for this venture was provided by pods of local selections and selected seed from Papua-New Guinea and Western Samoa introduced under permit. Further development on a plantation scale is planned.

Various Methods Of Establishment Tried

Various methods of establishment have been attempted. The Fijian does not take kindly to the traditional West Indian method of clearing and establishment of permanent, and ground shade before planting the cocoa. Inter-planting of thinned bush or established coconuts seems best for Fiji conditions. Planting at stake has been tried by a local company but was abandoned because of insect damage and the cost of regular spraying and replacements.

Standards of preparation and planting have been very variable. Recent surveys have shown the need for considerable rehabilitation and consolidation of planting, but there is definite evidence that the farming community is beginning to understand the requirements of the crop. Once the farmer realises that cocoa must have overhead shade, especially in its young stages, and that best results are achieved by careful manipulation of the shade as the tree grows, the standard of planting and maintenance will improve appreciably.

The successful introduction and establishment of Dadap (*Erythrina lithosperma*) from Western Samoa in 1955 has made a quick-growing permanent shade tree available in rapidly increasing quantities. Supplies do not yet meet demand, but with the development of cocoa stations this state of affairs will soon be remedied.

Planting is done by the farmer under Departmental supervision. The concentration of plantings has allowed of organized planting and supervision.

Cocoa Stations Being Established

The plant introduction and quarantine station at Naduruloulou is being rapidly developed as a cocoa station. Land for a similar station which will allow of more agronomic work has been acquired on Vanua Levu and plans for its rapid development are well in hand.

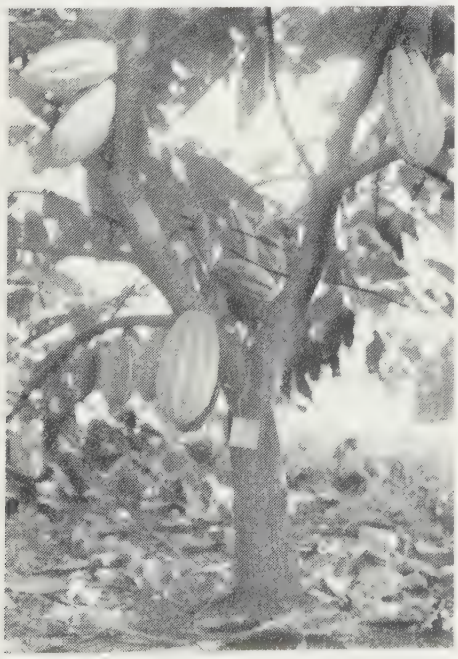
The development of these stations, both of which are situated in areas where large-scale development is possible, should give a tremendous fillip to planting.

The information collected during the past four years has assisted in the provisional selection of local clones. The performance of some of these compares very favourably with the highest yielding introductions.

By arrangement with Cadbury Bros. Ltd., pods of promising trees have been fermented by the Wadsworth-Howat method and the cured beans sent to them for an appraisal of quality. The reports received have greatly facilitated selection.

The necessary equipment for the laboratory manufacture of chocolate has been installed and a local tasting panel established.

Laboratory-prepared samples of cocoa beans have been sent to buyers in Australia, New Zealand, Japan, United States



Left: Seedlings of the Lafi 7 in bearing. Right: Seedlings of the ICS1 in bearing.

Above: A Samoan-type drier which has been erected at Naduruloulou. The uprights are of bush timber and the roof of thatch. Firebox is shown at bottom. (Author at right of photo.) Right: Drying tray in the newly-erected Samoan-type drier at Naduruloulou.

of America, Canada and the United Kingdom for assessments of quality and an indication of their market potential. Reports received to date suggest that the flavour of Fiji cocoa is predominantly mild. In order to ensure the production of beans with strength of chocolate satisfactory to the trade, the establishment of clonal seed gardens has been commenced. In addition, seed of West African Amelonado has been introduced from Malaya, and is being propagated at the Colonial Sugar Refining quarantine nursery on the Island of Bekana. When ready for planting out, it will be established in an isolation block on the mainland of Viti Levu.

Vegetative propagation of local and introduced selections is being carried out at Naduruloulou for the planting up of clonal nurseries and seed gardens. This work will also be done on the new Vanua Levu station.

An important stage in the industry has been reached. Cocoa planted in 1953 and 1954 is coming into bearing. An experimental fermentary and Samoan-type drier which could be constructed and operated by the average community of small farmers has been constructed at Naduruloulou and operated successfully.

Similar units are planned for Vanua Levu and Taveuni. More modern processing equipment suitable to estates will be installed at the new cocoa station at Vanua Levu. A programme of investigations into the fermentation, drying, and storage of cocoa on a laboratory and field scale has been planned and is being inaugurated.

The processing plant to be established on stations will enable the Department of Agriculture to carry out the necessary investigational work on a field scale, train subordinate staff, and handle the processing and drying of cocoa until such time as a satisfactory scheme of marketing has been evolved.

A firm foundation for a large industry has been established. Results have shown that conditions in Fiji are most suitable to the crop. The acquisition and development of stations has facilitated the commencement of an investigational programme. The next and very real problem is to see that cocoa of a quality suitable to the trade is exported, and that export standards are consistently maintained.

Prospects Bright For Future Development

Prospects for future development and expansion seem very bright. Increased supplies of planting material are now becoming available, and more rapid expansion seems possible. Interest, which has been keen and sustained, has been stimulated by recent marketing difficulties experienced by the banana industry and the urgent need for alternative crops in the sugar area of south-eastern Viti Levu. With ample land available and a rapidly increasing population, the stage seems set for the development of a large and profitable industry.

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Commission Assists Study Visits By Education Officers

The South Pacific Commission has provided a small fund to assist Pacific island administrations wishing to send their education officers on brief visits to other territories, to study other educational systems at first hand.

The Commission considers that this direct interchange of experience and opinion by those guiding and supervising the different educational systems in the islands will help general educational progress in the region.

After one such study tour last year, an education officer who spent four weeks visiting American and Western Samoa, Fiji, and Tonga wrote: "Reports, descriptions, schemes, cannot convey their full meaning unless they are read against a background of personal experience, of seeing, discussing, and evaluating, and I have no doubt at all that the material and information I have brought back will prove of great benefit to myself and to my staff . . ."

Administrations interested in obtaining Commission assistance towards the cost of such inter-territorial visits by their education officers are invited to write for further details to the Secretary-General, South Pacific Commission, Nouméa, New Caledonia.

Mosquito control workers spraying walls with insecticide. Right: Great care is taken to make sure the anti-malaria drugs are actually swallowed. A combination of the very effective, fast-working chloroquine and the slow-acting but long-lasting daraprim is used. Both insecticides and drugs used in the campaign are a gift from UNICEF.

Malaria Control In Netherlands New Guinea

A malaria control campaign based on residual spraying of houses with insecticides, started in 1954, has proved effective in Netherlands New Guinea, parts of which are as highly malarious as any in the world. Recently a supplementary campaign in a pilot area, in which drugs are administered to inhabitants of sprayed houses, has also brought encouraging results.

By D. METSELAAR*

NEW GUINEA has long been known as an inhospitable and unhealthy island. Mountains and marshes alternate along the coast, and for centuries these natural barriers have seriously impeded access to the country. And, in years gone by, hardly had the enterprising but unsuspecting visitor overcome these obstacles and penetrated the interior than he would fall victim to heavy and often fatal fevers.

These facts largely explain the poor development of the area and the isolation of many of the tribes still living in the interior as representatives of a stone age culture.

The earlier settlements of non-indigenous people in Netherlands New Guinea—mainly military detachments—had to be withdrawn because of the high death rate. Later settlements of agriculturists were similarly not very successful. Though at that time it was already recognized that the much-feared fevers were caused by malaria parasites, and that a fatal outcome could be prevented by quinine, the disease rate was so high that it seriously impaired the energy of settlers and the success of their enterprises.

Malaria is caused by small parasites living for the greater part in the red blood cells. They are transmitted from one person to another by mosquitoes of the genus *Anopheles*, to which many species belong. In New Guinea, the main vectors of malaria are members of the *Anopheles punctulatus* group.

Not every anopheles bite is dangerous to man; the mosquito has to infect itself first by sucking the blood of a human parasite carrier. Even then this mosquito is not immediately dangerous for another human being from which it takes blood, because malaria parasites need about ten days for development inside the mosquito before they are ripe for transmission. By then they have reached the salivary glands of its mosquito host from whence they can easily be injected into the blood of man.

From this it may be concluded that only that anopheline mosquito which has taken a blood meal on a human parasite carrier and, after that, has survived for about ten days, is dangerous to men. Hence the number of dangerous anopheles mosquitoes depends on the total number of anophelines; on the chances of these anophelines becoming infected by sucking blood of human parasite carriers; and on their chances of surviving for about ten days. Two of these factors work unfavourably in New Guinea because, naturally, both the number of anophelines and the number of indigenous people carrying parasites in their blood are high.

* Head of the Division of Malariology, Department of Public Health, Netherlands New Guinea.

Temporary laboratories now occupied by the Division of Malariology during the building of permanent quarters.

With regard to the longevity of anophelines, little is known from direct observations, but indirectly it can be calculated that, in nature, only a small fraction lives longer than ten days. Moreover, within the genus *Anopheles* variations are found and, compared with species of anophelines in other parts of the world, anophelines of the *punctulatus* group are relatively short-living.

Recent research[1] has shown that notwithstanding the latter favourable factor, parts of New Guinea belong to the most serious malarious (so-called holo-endemic) areas of the world. In those parts, unprotected natives may be bitten by infective anophelines more than 100 times per year, and children are infected at an early age. Fortunately, these children derive some degree of immunity from their mothers and so most of them survive the infection. Later on these gradually develop a high degree of immunity themselves. However, a considerable number still die, either directly by malaria or indirectly because their resistance to other diseases is weakened.

At adult ages the survivors have gained such a degree of immunity that notwithstanding continuous re-infections, parasites can no longer develop unrestricted and they become scarce in the human body. On microscopical examination of the blood they often cannot be detected.

If, therefore, the percentages of parasite-positives in the population of a holo-endemic region are plotted against age, a typical curve is produced from which the development of immunity with growing age can easily be recognized (see graph "—1954 before spraying").

Control Difficult

Malaria control in such a holo-endemic area is difficult. Elimination of anopheles breeding places as a way of reducing the mosquito population is possible only in restricted areas, and at high cost. It has been practised in New Guinea on a small scale. More possibilities were revealed, however, when the residual action of certain insecticides (DDT, Dieldrin, BHC) was discovered. When applied as a solution or an emulsion to the inner walls of houses, these insecticides are able to kill mosquitoes landing thereon, and this action lasts 3-6 months.

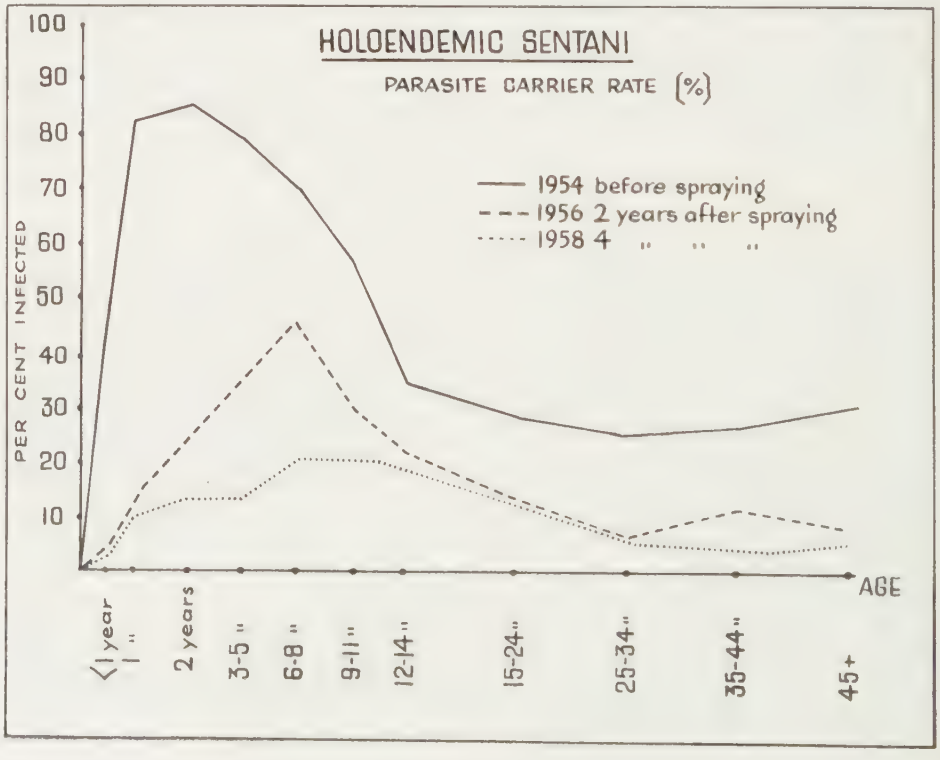
Because anopheline mosquitoes need a blood meal every two or three days, there is little chance that these insects can escape the action of the insecticide if they are in the habit of entering sprayed houses for their blood meal and favour walls as resting places. In countries where anophelines usually do so, residual spraying has proved very effective in stopping the transmission of malaria.

It was long feared, however, that malaria transmitted by anophelines of the *punctulatus* group would not respond favourably to insecticide spraying because these mosquitoes had a reputation for not entering houses for a blood meal and thus would avoid contact with insecticides. Recent investigations[2], however, have proved beyond doubt that *punctulatus* certainly prefers outdoor biting, but is not at all reluctant to enter houses when people sleep inside.

Though it cannot be expected that an anopheline population which only facultatively enters houses will be completely eradicated by residual spraying, a considerable effect is nevertheless

[1] D. METSELAAR. A pilot project of residual insecticide spraying in Netherlands New Guinea, contribution to the knowledge of holo-endemic malaria. Thesis, Leyden, 1957. Printers: Kemink & Son, Utrecht.

[2] P. H. VAN THIEL. *SPC Quarterly Bulletin*, April 1955. "Malaria Control by Insecticide Spraying".



Graph showing parasite carrier rate of various age groups before and after spraying of houses with insecticide.

possible on the number of mosquitoes and on longevity, and thereby on the transmission of malaria. What actually happens under these circumstances is that by the killing of mosquitoes whenever they enter sprayed houses, the average duration of anopheline life is shortened considerably, and the chances that a number of these insects will survive longer than the ten days required for the maturation of malaria parasites become small. Besides, especially those anophelines which have a good opportunity to infect themselves on parasite carriers are killed selectively.

The possibilities of malaria control by means of insecticides in New Guinea are therefore not so gloomy as appeared at first sight.

Residual Spraying Campaign

In 1954 residual spraying was started in the Dutch part of the island, and since then the sprayed area has been extended gradually. The insecticide used is DDT and spraying is repeated every six months. By the end of 1957, about 120,000 inhabitants enjoyed protection against malaria by the new method. Part of these were living in holo-endemic, part in less-endemic areas.

Holo-endemic villages around Sentani Lake near Hollandia served for special observations. As appears from the graph, a considerable parasite reservoir was present in the population before spraying. Since spraying started, surveys have been repeated each year. However, for the sake of clarity, only the curves for two and four years after spraying are given. From these it can be seen that the parasite reservoir diminished gradually, though in January 1958 it was still of some importance. Further, it appears that among children under the age of four years and thus born after the first spraying, some positives are found. This signifies that—at least in the holo-endemic parts of New Guinea—transmission cannot be stopped entirely by residual spraying.

Complete interruption of transmission was most probably achieved in some of the less malarious areas sprayed. It seemed, therefore, worth while to consider additional measures which could enable us to reach the goal of malaria eradication in the more seriously-handicapped regions also. In consultation with UNICEF (which organization shows a keen interest in malarial control in Netherlands New Guinea, and provides the insecticides) it was decided to make new attempts to diminish, and eventually eradicate, the parasite reservoir.

These attempts are at present under way. This time the attack is directed against the malaria parasite itself. While residual spraying continues to hamper mosquito life, drugs are provided to all inhabitants of the sprayed houses in an attempt to kill as many of the parasites as possible. A combination of the very effective and rapidly-working chloroquine and the slow-acting but long-lasting daraprim is provided three times. The drugs are a gift from UNICEF.

After preparation of the DDT emulsion in a bucket, the spray pump is filled through a strainer.

Inhabitants Registered

House-by-house registration of the inhabitants is carried out, and at monthly intervals the drugs are distributed and swallowed under supervision of members of the staff of the Division of Malariology.

Experience was gained in a pilot area in which the results, one year after the last drug administration, were encouraging[3]. In part of the villages no parasites could be found in the blood-smears of the people examined. In other villages the percentage of carriers was diminished greatly, while in two hamlets only, for reasons so far unknown, drug administration was not successful.

Before the main drug campaign started, sample surveys were performed in many villages all over the sprayed areas of Netherlands New Guinea. The surveys will be repeated about six months after the last drug administration. We look forward with hopeful interest to the results.

[3] W. J. O. M. VAN DIJK. Mass chemoprophylaxis with chloroquine additional to DDT indoor spraying (in press).

Marquesas Journey

(Continued from page 21)

It is a fact that the remoteness of the islands and the few maritime links they have with Tahiti and the rest of the world do not encourage economic development. Progress might be facilitated if ships from Tahiti en route to France could call at the islands as they used to do in the past.

This remoteness was the major cause of the failures sustained by the few European commercial firms which attempted to establish themselves in the islands. It explains also why commercial cattle raising was doomed, although the soil appears to be suitable for grazing, since the local market could attract only a small proportion of the produce.

Today, fishing is important only inasmuch as it provides food for the islanders. However, Japanese longline trawlers fish in these waters, and this is an industry which might be investigated as a possible source of revenue for the Group.

A Brighter Future

Until quite recently the position in the Marquesas seemed desperate. Now, there is reason for hope. Both population and commercial production are increasing. Undoubtedly a great deal still remains to be done in the social, health and economic fields, but improvements are possible, and there are ways and means of restoring to the Group and its most interesting people the moral and economic balance which, not so very long ago, seemed hopelessly impaired.

Young cinnamon plants being raised under woven coconut leaf baskets. The taros are kept in the drainage ditch alongside the nursery until set out.

A Garden For Truk Intermediate School

In April 1956 the author, in collaboration with the Commission's plant introduction officer, planned a garden for Truk Intermediate School. The project has proved highly successful, with almost six acres now under a wide variety of vegetables and fruits.

By RAYMOND J. McKAY*

THE school garden at Truk District Intermediate School is now two and one-half years old. Before that, the garden work was mainly planting sweet potatoes.

Planting sweet potatoes four afternoons a week is hard on the back and morale. So, when I returned one day from a three-months' language study trip to one of our atoll islands, I was not too surprised to find myself with an additional assignment. I had been developing a shop programme; now, I was to take charge of the agriculture programme.

Luckily, a fellow by the name of Jacques Barrau from the South Pacific Commission was on Truk at this time, so I looked him up and started asking questions. My first went something like this: "We'd like to start a school garden at Intermediate School. Can you help us?"

"Yes," said Jacques, "but, first, I'll have to know what purpose you have in mind, the nature of the subsistence agriculture now practised, the land available, and more about the school".

My purpose was simple: I'd been told to do it.

Since then, I have learned that a school garden can have many purposes. I'm glad that Jacques suggested the one he did for us. But, more about purpose later.

The nature of the subsistence agriculture as now practised by the Trukese? It's subsistence with a capital "S". Breadfruit is their mainstay. Taro and bananas are their second most important food crops. The coconut not only forms a large part of their diet, but also brings in a good deal of money. Other crops cultivated: pineapple, sugar cane, sweet potatoes, yams, and papayas. These crops take considerable care for maximum yields, and are not easy to harvest and prepare.

The land available? The school is in the American Administrative Area. This is on the island of Moen in Truk Atoll, and is only one of thirty-nine populated islands in Truk District. The Administrative Area takes in approximately forty acres. When you subtract the area taken up by roads and buildings, there isn't much arable land left.

Jacques and I walked—or rather, waded—through cane grass to a small plateau of, roughly, three acres. This was the spot where we were to start our school garden. Jacques said that he would have to leave on the 'plane the next morning, but before he went he would write me a short paper telling me what I would need to know in order to make a beginning. Meanwhile, he said, he would need to know more about the school and district.

This is what I told him (brought up to date):

Our government-operated Intermediate School gets its students from the various elementary schools scattered throughout the district. We are co-educational. There are thirty-nine populated islands in Truk District, and we get students from all of the populated islands. We have about two hundred students enrolled (grades 7, 8 and 9), of whom thirty-five are girls. Each student has twenty hours per week of academic work, four of shop, four hours of agriculture, and four hours of campus detail. (The girls take home-making instead of shop and agriculture.) The agriculture programme is divided into two hours of garden work and two hours of related classroom work each week.

Truk District itself runs about three hundred miles north-south and east-west. All the islands are low coral atolls except the fifteen high volcanic islands in Truk Atoll. Truk Atoll is located approximately in the centre of the district. It is surrounded by a barrier reef and small reef islands. The Atoll is twenty-five miles north-south and thirty-five miles east-west. It's pear-shaped with the stem pointing west.

Later that day Jacques handed me his paper. The next morning, he left. The date was April 10, 1956.

* Education and Training Specialist, Truk, Eastern Caroline Islands, Trust Territory of the Pacific Islands under United States administration.

Papayas and one-year-old pineapples inter-planted with ratoon crop.

Breadfruit orchard inter-planted with tapioca.

We've used the advice of Jacques' paper ever since. Our school garden is based on it.

The Planting Plan

What was in Jacques' paper?

First there was a list of the tubers: swamp taro, yautia, wild or elephant ear taro, yams, sweet potatoes, and tapioca. A few short sentences explained where the plants will grow, how they are propagated, when to harvest them, and what to expect in the way of average yield.

Next came the trees: breadfruit, Polynesian chestnut, Indian almond, coconut, banana, and fruit trees. The same kinds of information that were given for the tubers were set forth for the trees. Also, specific points were noted. ITEM: "Breadfruit must be one of the main crops of the school". ITEM: "Bananas must be planted in large quantities as, along with taro, they are an important source of food between the breadfruit seasons".

Then came vegetables and other crops, with a section telling where to grow these crops. Typical cyrtosperma and colocasia growing beds were sketched.

Following this, a scheme showed these four areas on Moen: (i) Sandy coral, for coconuts and breadfruit. (ii) Swamp area, for taro. (iii) Loamy clay alluvium, for breadfruit, bananas, xanthosoma, yams, pineapples, papayas, fruit trees, and sweet potatoes. (iv) Lateritic hillsides, to be re-forested.

Finally, Jacques' paper told how many of each kind of plant each student should plant each year: Three breadfruit trees,

TRUK INTERMEDIATE SCHOOL GARDEN CROP AREAS

(AREA UNDER CULTIVATION—5.76 ACRES)

Area	*Feet*	*Acres*	*Plant*	*Distance Apart*	*Number of Plants*
I	75′ x 250′	.43	Bananas	10′ x 10′	140
			Soursop	12′	10
			Alocasia	3′ x 3′	165
II	325′ x 300′	2.238	Papaya	15′ x 15′	90
			Pineapple	3′ x 3′	950
			Mangosteen	15′ x 15′	15
			Guava	20′	4
			Cherimoya	14′ x 14′	10
III	230′ x 290′	1.53	Breadfruit	25′ x 25′	120
			Soursop	12′	10
			Tapioca	9′ x 9′	625
			Papaya	15′	20
			Sweet potatoes	.3 acres	
IV	81′ x 100′	.186	Yams	6′ x 6′	28
			Yautia Taro	6′ x 6′	180
V	100′ x 180′	.413	Sugar Cane	4′ x 4′	160
			Avocado	15′ x 15′	53
VI	130′ x 160′	.478	Bananas	10′ x 10′	226
			Cacao	8′ x 8′	37
VII	300′ x 70′	.482	Cyrtosperma	3′ x 3′	2100
			Colocasia	2′ x 2′	8300
VIII	School Campus		Papaya		6
			Bananas	10′	60
			Mahogany	8′ x 8′	8
			Orange	15′	18
			Cacao	8′ x 8′	7
			Breadfruit	30′	22
			Malibar Chestnut	25′	15

TRUK SCHOOL GARDEN
Crop Yields For 1957

Crop	*1957 Harvest Totals*
Cyrtosperma Taro	685 pounds
True Taro	565 ,,
Yautia Taro	740 ,,
Potatoes	4960 ,,
Yams	285 ,,
Bananas	1230 ,,
Pineapple	420 ,,

two to four yams, six bananas, twenty cyrtosperma, ten colocasia, and ten xanthosoma. We have had to revise these figures, depending on the availability of planting material. But, here was our guide. All we had to do was go to work.

We hired an agriculture teacher-supervisor, Takeo, who was Japanese-trained. His job was to translate Jacques' paper into action.

Then, we hired a toolroom man with the ability to double as a garden foreman. This was Tasi. Our last step was to acquire a teacher-garden supervisor by the name of Iokitaro.

At the outset we had the problem of getting planting material. We wrote letters to various island councils, asking for help. Then, on specified days, we took students to do the collecting. Meanwhile, other students were building a nursery and clearing the ground for planting.

This is what we did with the planting material: We placed the breadfruit root cuttings in the nursery. Then, we cleared the land and planted bananas, pineapples, sweet potatoes, yams, and the various taros.

After nine months the breadfruit cuttings were ready for planting orchard style. We prepared holes in the potato patch and planted the first group. This is now a continuous operation.

Each year more cuttings were collected and more trees planted. The same procedure was used with other plants—collect, clear, and plant. Today, we have almost six acres under cultivation. (See accompanying table.) Our planting of subsistence crops has fallen into a smooth routine.

One other problem we had was introductions. Here is how we tackled this one: We got in oranges, mangosteen, Malabar chestnut, and other plants from the Ponape Agricultural Department. Avocados and Haydn mangoes came from Guam. We received papayas and citrus budwood from the University of Hawaii. One lone pepper plant found its way to us from Fiji. We hope to continue making introductions through the assistance of our own Agriculture Department.

In retrospect, we think the programme has been successful. Student morale is high; the class and garden work have developed together. Students get an occasional meal from the garden, and money received from produce sold is credited to the study body fund. (Table records crop yields for one year. The figures would have been higher if we hadn't stressed tree planting so heavily.)

And our purpose has been this: To help students to understand, at firsthand, how useful plants can be made to grow in a neat, orderly, organized fashion.

I haven't covered the heartaches that go along with this: plans that don't work, blisters and bruises, typhoons and droughts, lost or stolen tools, and just plain lack of knowledge.

But, if you want to help yourself to a school garden programme that will keep you and your school up to the ears in wasps, sword grass, plus real achievement, just drop J. Barrau a line.

This tropical basket willow growing at the Pirae experiment station near Papeete is showing promising results. Tall and slender, the species produces excellent withes for basket weaving.

Tropical Basket Willow Introduced To Tahiti

In the Austral Islands in the southern part of French Polynesia, the inhabitants weave beautiful baskets. They use for that purpose the roots of a plant of the Pandanus *family called* Freycinetia *by the botanists and* KieKie *by the Eastern Polynesians.*

The demand for basket work from the Austral Islands is increasing, but the supply of weaving material is fairly limited. The Department of Agriculture of French Polynesia has therefore introduced several species of basket willow. One of them planted in the Pirae experiment station and introduction garden near Papeete is showing promising results. It is Salix humboltiana *Willd., a species suitable for tropical climates. Introduced from the French West Indies, it had its origin in the mountains of tropical South America.*

Its twigs can be used for weaving just as those of the basket willows growing in temperate climates.—J.B.

Commissioners, advisers and principal officers of the Secretariat who attended the eighteenth session. Left to right, front row: Mr. C. G. R. McKay, N.Z.; Mr. H. Nettre, France; Dean Knowles A. Ryerson, U.S.A.; Mr. T. R. Smith (Secretary-General); Sir John Gutch, U.K.; Mr. J. R. Halligan, Australia; Dr. Th. P. Bergsma, Netherlands; Mr. Papali'i Poumau, N.Z.; Middle Row: Mr. C. T. Moodie, Australia; Dr. A. H. J. Kroon (Executive Officer for Economic Development); Dr. Arthur S. Osborne, U.S.A.; Miss Edna H. Barr, U.S.A.; The Honourable Delmas H. Nucker, U.S.A.; Mr. D. M. Saywell, N.Z.; Mr. J. Rookmaaker, Netherlands. Back row: Dr. E. Massal (Executive Officer for Health); Mr. J. S. Rennie, U.K.; Mr. J. Herry, France; Dr. A. Loosjes, Netherlands; Dr. Alexander Spoehr, U.S.A.; Mr. B. J. Meek, Australia; Dr. R. Seddon (Executive Officer for Social Development).

Commission Reviews Work Programme

At its eighteenth session held at Noumea from September 26 to October 12, the South Pacific Commission reviewed progress made in its work for island peoples, and made plans for its continuance. Main decisions of the session are briefly recorded below.

THE eighteenth session of the South Pacific Commission was held at Commission headquarters in Noumea from September 26 to October 12. It was attended by representatives from the six member nations, Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America, the chairman being Sir John Gutch, K.C.M.G., O.B.E., Senior Commissioner for the United Kingdom.

The meeting studied progress made by the Commission in all its fields of work since its session in October, 1957, and approved plans for its 1959 programme.

All-Out Campaign Against Rhinoceros Beetle

At the session the Commission placed strong emphasis on the imperative need for an all-out campaign by governments, territories, and scientific bodies against the rhinoceros beetle, which has become a major threat to the economy of the South Pacific. Each year it causes serious losses in copra output from the islands it infests, which include Western Samoa, Tonga, Wallis Islands, New Guinea, Palau Islands and Viti Levu in the Fiji Group.

The Commission finalized plans for intensifying its own campaign against the pest. A meeting of its rhinoceros beetle advisory committee of leading Pacific entomologists will be held in Suva from February 16-20 to review results of present campaigns against the beetle, and to plan further action. The Commission's insect pathologist, Dr. Paul Surany, will attend. Aided by a Rockefeller Foundation grant, he is at present studying diseases of the rhinoceros beetle at his research headquarters in Kenya.

Arrangements are being made for two entomologists to undertake a further search in West Africa and South America for predators and parasites likely to attack the beetle in the Pacific.

The Commission also made a further grant of £3,000 for 1959 to assist the investigation being carried out on its behalf by the Institute of Scientific Research in Madagascar. Its purpose is to discover the natural enemies of the rhinoceros beetle that apparently are keeping the pest in check there, to collect the most promising, and to introduce them to beetle-infested islands in the Pacific.

Practical Training Courses for Islanders

The Commission will play an increasingly active part in promoting and conducting practical training courses for Pacific islanders. Following two such courses already held in fisheries and health education there will be others in literature production and in boat-building, repair and maintenance. It is planned to hold both in the Solomon Islands in 1960.

The commission also directed that its experts in co-operatives, health education, and public health should assist territories in training local personnel in these fields, both by planning and by taking part in suitable courses.

Two Top-Level Meetings Approved

The Commission also approved the holding of two meeting of top-level experts towards the end of 1959. A seminar to study problems of Pacific education will be held in Brisbane, while a study group meeting in Noumea of specialists in filariasis and elephantiasis will examine the Commission's ten years of work in the field of mosquito-borne diseases, and make recommendations for future action.

Plant Collection and Introduction

The Commission's plant introduction officer, Dr. Jacques Barrau, supervises the collecting and testing of selected economic plants in the Pacific for distri-

bution and exchange among the territories, as well as distribution of plants outside the region. His recent work has been concentrated on coffee, cocoa, root and green vegetables, breadfruit, pepper, bamboo, other possible cash crops, and forage and pasture plants.

During the year preceding the session the Commission's new plant introduction service had, in response to requests from territories, distributed among them planting material of 112 species and varieties of economic plants.

The Commission approved a further grant for 1959 of £stg.1,000 to the plant introduction station at Naduruloulou in Fiji, which collaborates closely in this work. Additional crops to which special attention will be given are legumes suitable as cover crops, and the cereals, maize, rice and sorghum.

Further Work in Fisheries

The development and better use of the fish resources of marine and inland waters in the Pacific are main targets of the Commission's fisheries programme, which is being carried out by the fisheries officer, Mr. H. van Pel.

The Commission noted with pleasure the fact that the large majority of the twenty-five Pacific islands trainees who attended its fisheries course in 1956-1957 are now employed in useful fisheries work in their own territories. A further training course in practical fisheries planned for 1960 will be designed to encourage far greater use of small motor fishing boats in the Pacific, and of fish traps and weirs. As before, the assistance of the Food and Agriculture Organization will be sought for this project.

A marine biologist will be engaged in 1959 to conduct preliminary research in the Cook Islands on the commercially-valuable blacklip oyster.

The possibilities will be explored of providing training for islands people in simpler methods of fish preservation.

Coconut Industry

The economic development members of the Commission's expert advisory body, the Research Council, will meet in 1959. Among other priority subjects they will study problems of the coconut industry and indicate possible Commission action to assist in solving them.

The Commission approved a grant of £stg.1,500 towards the 1959 programme of the new French coconut research station being set up in Rangiroa Atoll in the Tuamotus. Short-term research on trace element deficiencies in atoll soils already begun there offers promising possibilities for stepping up coconut production.

Agricultural Technical Meeting

The possibilities will be explored of holding a meeting of territorial officers engaged in agricultural extension work. If possible it will be planned around demonstrations in the field. The Commission received with appreciation an invitation from the Government of Western Samoa to hold a demonstration tour in cocoa growing in that territory.

Production of Islands Literature

The Commission plans to open a literature production training centre in 1960 at Honiara, in the British Solomon Islands to assist territories to set up their own printing and publishing facilities by providing them with trained staff.

The United Nations Educational, Scientific, and Cultural Organization is actively collaborating in the scheme, for which financial assistance will be sought by the Commission from the United Nations Technical Assistance Board.

The chairman of the eighteenth session, Sir John Gutch, arriving at Noumea's airport.

New Women's Interests Project

At the eighteenth session, final details were approved for a new project in which an officer specially appointed for the task, Miss Marjorie Stewart, will actively promote the interests of Pacific islands women. Miss Stewart is at present director of the Y.W.C.A. tropical community centre in London.

In her new post she will collaborate with village and community authorities in establishing a programme for women's activities that will take account of their home and community needs and opportunities. She will develop women's groups as one way of furthering their progress towards family and community betterment.

A leading women's organization in the United States, United Church Women, has made a grant of $30,000 to assist the Commission in this new field of activity.

SPC Meeting on Co-Operatives

Last July, a technical meeting on co-operatives was held under Commission auspices in Port Moresby. It was attended by co-operatives officers and administration officials from Pacific territories, and by observers from the Governments of Australia and the United States, and from the Food and Agriculture Organization of the United Nations.

After studying the report of the meeting and its recommendations for organizing co-operates and of training staff to run them, and on ways the Commission could help territories with their co-operative programmes, the Commission authorized important expansion of its work in this field. Its co-operatives officer will plan and take part in local training courses, the exchange and study travel of territorial co-operatives officers will be facilitated, and simple practical training and instruction manuals will be prepared. Training courses for experienced co-operatives officers will also be organized.

Tuberculosis Conference

The Commission approved arrangements for the holding of a regional tuberculosis conference in Pago Pago, American Samoa, to study tuberculosis as a community disease in the Pacific.*

Nutrition and Diet

In this field the Commission is concentrating on practical applications of the results of its past research on the nutrition problems of Pacific islanders, carried out in co-operation with the Food and Agriculture Organization.

The latter body will be invited to provide a specialist to advise on the economics of food production and distribution in the Pacific.

Fourth South Pacific Conference

The Commission reviewed final arrangements for the holding next April of the fourth South Pacific Conference at Malaguna, near Rabaul in New Britain. It is expected that over seventy delegates from nineteen Pacific territories will attend. (The Conference is a regional meeting of island peoples convened by the Commission every three years.)

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* An account of this Conference, which was held in November last, appears elsewhere in this issue.—Editor.

The coffee nursery at Taravao, in Tahiti, has an output of 300,000 seedlings a year.

Coffee Production Increasing In French Polynesia

IN the issue dated 6 January 1898 of the *Official Gazette* of the then "Etablissements Français de l'Océanie" one can read that the "Jardin Raoul", which at that time was the experiment and plant introduction garden of Tahiti, was distributing coffee seedlings to planters interested in this "new" cash crop.

As a matter of fact, the coffee tree was introduced far earlier to the island, where Captain Marsden had brought it in 1817.

Several species and varieties were later introduced, including *Coffea arabica, C. canephora* or "Robusta", and *C. liberica* or "Liberia". Only the first was planted to any extent—a rather limited one, as a matter of fact. In 1938, for example, only 75 tons of Arabica coffee were exported. After the last war this production was even less important; only 30 tons were exported in 1953.

300 Tons Exported In 1956

The Department of Agriculture then launched a vigorous drive to develop production in an effort to diversify the local cash crops. The campaign was fairly successful, for in 1956 more than 300 tons of coffee were exported to France.

Rows of coffee seedlings growing under one of the shade canopies of palm fronds.

Huge coffee nurseries are now being organized to grow and distribute planting material to local farmers. One on Taravao Peninsula, Tahiti, has an annual capacity of 300,000 seedlings per year.

The South Pacific Commission has been of some assistance in this coffee production development and improvement scheme by obtaining in 1956 from the United States Department of Agriculture for the Department of Agriculture of French Polynesia, seedlings of 37 varieties of coffee (mainly of *Arabica*). This collection of new varieties has been established on Taravao Station and some are now thriving there.—J.B.

The International Review Of Health Education

IN January of last year the first issue of an international health education journal was published with the above title. A quarterly, it is available in both English and French editions.

The International Review of Health Education is the official organ of the International Union for Health Education, which is endeavouring to promote the idea that health education must be the forerunner of action in the field of health throughout the world. There is an urgent need to compare the experience gained in various countries, programmes, current research, methods and equipment used, etc.

By enlisting the help of all those interested in health problems, at national and international levels, the editors hope that this journal will fill a very real gap in the field of health education.

Three issues have already been published. Of quarto size, each contains approximately fifty pages. Articles are featured on basic subjects such as health education as applied in different environments, vocational training, current studies and research work, methodology, national and international achievements, and so on. In addition, there is valuable information with news and comments, reviews of health education books and audio-visual aids, and also a bibliography of research work on health education.

To all who are participating in the health education activities initiated and pursued with the help of the World Health Organization and the South Pacific Commission, *The International Review of Health Education* should prove a valuable means of obtaining and exchanging information.

Subscriptions can be obtained from: *Revue Internationale d'Education de la Santé*, 3 Rue Violler, Geneva, Switzerland. Annual subscription is £stg.1 ($3.00 U.S., 1,200 French francs metro., or the equivalent in other currencies).—E.M.

SOME NOTES ON . . . . . .

Fisheries In The New Hebrides, Fiji And Tokelaus

Seven Japanese longliners are being kept busy supplying fish to a new cannery at Santo, in the New Hebrides. In Fiji, the stocking of rivers with new fish species is being considered. Blacklip pearl shell and trochus may shortly be introduced to the Tokelaus. These are highlights of this brief report, prepared following a recent field visit to the three territories by . . .

H. VAN PEL*

Mr. Van Pel, aided by a local diver, investigating marine life on a small reef plateau in the lagoon of Fakaofo Atoll.

FROM a fisheries officer's point of view one can hardly imagine three territories more dissimilar from one another than those under review here. The contrasts were brought into even greater relief when of necessity I had to visit all three in a short period of time—from late August to late October last.

New Hebrides Developments

In the New Hebrides, fisheries were practically non-existent until about a year ago. At the time of my visit, however, it had become one of the foremost fish-producing areas in the South Pacific. This change was brought about by the establishment on the island of Espiritu Santo of the South Pacific Fishing Company, in which are represented American, Japanese and local interests.

Activities of the company include fishing as well as the cold storage, curing, transport and marketing of fish. The fishing fleet consists of seven Japanese boats averaging 100 tons gross, with a crew of 25 to 30 fishermen each. The fishing technique used is longlining. The catches average 60% albacore, 20% yellowfin tuna, 15% marlin and sailfish, and 5% miscellaneous fish.

At the time of my visit, 42 New Hebrides islanders and 34 Japanese labourers were employed in the freezing plant, ice factory and curing plant. The frozen albacore and yellowfin tuna are shipped to San Francisco at the rate of 600 tons every two months. Every three months, 100 tons of frozen and processed fish are sent to Japan. Small quantities of frozen fish are sent to Honiara and Nouméa, and a certain amount is marketed locally.

As mentioned elsewhere in this issue, the plant is now ready to produce fish flakes commercially.

Apart from this large undertaking, fisheries in the New Hebrides have made modest but interesting progress along other lines. Lakes, streams and swamps in several islands have been stocked with *Tilapia mossambica*, which are now thriving. Specimens 10" long, weighing 14 ounces, have been recorded in Santo.

Quite a few enquiries from private people have been answered. Subjects included the construction and operation of fixed fish-traps, reef nets, and fish preservation.

Lastly, in order to conserve natural resources, fishing for trochus and green snail has been suspended in the New Hebrides, pending the framing of new regulations.

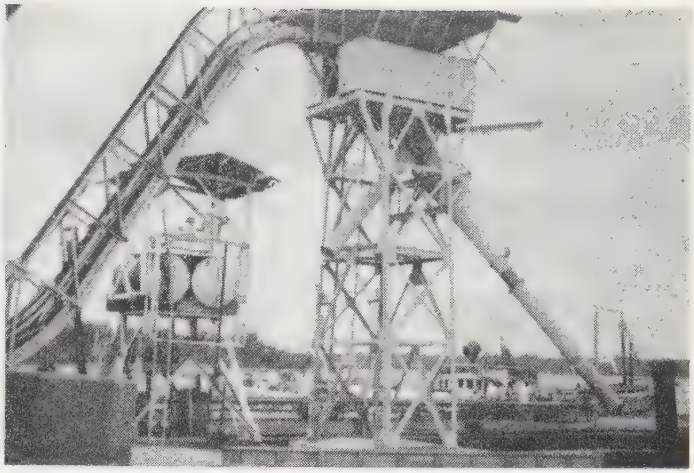
Stocking Of Rivers In Fiji

In Fiji, considerable attention has been devoted lately to fisheries matters.

One item worthy of mention here is the possibility of stocking the rivers with

*Fisheries Officer, South Pacific Commission.

Above: This haul resulted from a communal fish drive carried out by inhabitants of Atafu Atoll. The entire village will share in the catch. Right: Seven hundredweight of green and red parrot fish taken in another drive off Atafu Atoll.



Above: A Japanese longliner, one of the fleet of seven engaged in catching fish for the South Pacific Fishing Company at Santo, in the New Hebrides. Right: The Company's jetty at Santo, with combined conveyer belt, crusher, and chute for loading crushed ice direct into the holds of the longliners.

new species. A preliminary investigation of the Navua River has already been made. It is hoped that a more extensive survey of this and other rivers and streams of Viti Levu can be carried out early in 1959.

Shell Introduction For Tokelaus

Atafu and Fakaofo, two of the three atolls comprising the Tokelau Islands, under New Zealand administration, were visited. Present fishing methods and gear seem quite adequate to provide the islanders with their subsistence requirements without depleting the resources of the lagoons and reefs. Fish and shellfish are staple foods there. Communal fishing was observed in Atafu and the resulting catches were fairly good.

As a result of the survey, recommendations are being made for the introduction of blacklip pearl shell and trochus, which should, as far as can be seen now, find suitable habitats in the lagoons and on the reefs.

On the trip from Fiji to the Tokelau Islands some live trochus were taken along in order to test the "dry" method of transport. In spite of adverse conditions they survived for three days without losses.

Above: Unloading tuna at Santo. Mr. Don Gubay, Director of the South Pacific Fishing Company is in the foreground (right) with a Japanese representative of the Company. Below: Navua River, Fiji. A preliminary investigation has been made with a view to stocking this and other rivers in Fiji with new species of edible fish.

Breadfruit Study In French Polynesia

Close on one hundred varieties of breadfruit were studied by the Commission's plant introduction officer, Dr. Jacques Barrau, during a fortnight's cruise he made of the Marquesas, Society and Leeward Islands in September on board the French Navy frigate "La Confiance".

Data he collected formed a valuable contribution to the regional study he is making of breadfruit, which it is hoped will enable the present short season of yield in most islands to be extended by introducing strains bearing at different times of the year.

Above: General view of the piggery established by Leylands Limited at Naboro, near Suva. Right: Strong and healthy pigs are raised by cross-breeding with a variety of breeds such as Tamworth and Berkshire. With modern scientific methods the Company is now producing pigs for marketing at the rate of 1,200 a year.

Modern Pig Raising In Fiji

A production target of 100 pigs per month for market has been reached by this piggery established by a Suva firm of butchers at Naboro, near Suva, with the close co-operation of the Fiji Department of Agriculture.

By A. F. S. OHMAN*

THE happy combination of investment by private enterprise, and advice and assistance given at every stage by the Department of Agriculture, has been responsible for a pig-raising establishment in Fiji which has proved of considerable value to the Colony.

This property was visited some time ago by a former veterinary head of the Department of Animal Industry, New South Wales (Dr. G. Belschner) and he described it as better than anything of its kind he had seen anywhere in Australia. This opinion has also been voiced on a number of occasions by other stock experts who have been able to visit the property. The owners of the piggery at Naboro, about fourteen miles from Suva, are Leylands Limited, a Suva firm of butchers with a Board of Directors of Chinese businessmen headed by Mr. Kam Chee. The company has already invested nearly £40,000 in the enterprise.

The pigs are housed in concrete pens with walls of steel airfield matting. The general plan was prepared by the De-

(Continued on page 48)

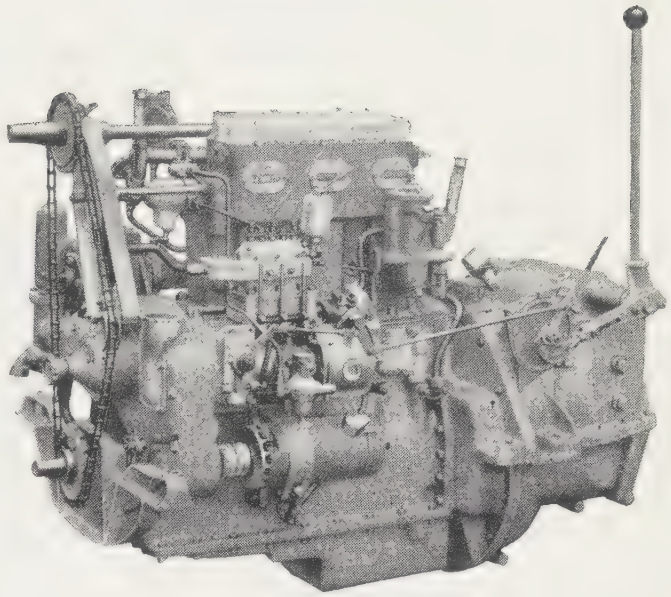
*Chief Veterinary Officer, Department of Agriculture, Fiji.

Above: Feeding time. Twice daily, pig-foods are carried in trucks pushed along permanent running rails set in concrete pathways between the lines of pens. Right: The pigs are raised in concrete pens which are hosed down twice daily with water under high pressure.

Marine Engines For Pacific Fishermen . . . (2)

In this instalment the author discusses engines of below 8 h.p., the advantages of outboard motors, and the installation of marine engines.

By ARTHUR N. SWINFIELD



This Gardner Model 31W three-cylinder marine diesel engine develops 42 b.h.p. at 1300 r.p.m. Unit construction reversing gear box is incorporated.

THE foregoing comments refer of course to engines in the vicinity of from 8 to 48 h.p. Below 8 h.p., we find innumerable small engines ranging as low as 2½ h.p., in both petrol and diesel models. In this particular field we recognize many makes of outstanding performance. Competition has been, and still is, very keen.

The amount of work done by these small units is prodigious. They are simple to install and are relatively cheap and economical to operate. Every particular manufacturer offers some exclusive feature, and it can be truly said that these "mighty midgets" give real value for money.

Once again they are built as two or four-cycle units, petrol or diesel, etc. One particular make features a variable-pitch, reversing propeller, and this, coupled with a reduction gear, would appear to be an ideal unit.

The variable-pitch propeller is operated by a lever (behind the engine) and by this means the propeller blades can be "twisted" (or pitched) at will, so loading the engine to its maximum efficiency and providing an excellent reverse system without the use of gears, etc. Needless to say, an extra set of blades would be a good investment.

While on the subject of variable-pitch propellers, it should be stressed that these units could well be employed on *any* vessel. Although rather expensive in the larger horsepower groups, this could be offset by the lower price of an engine *without reverse gear*. The method of propulsion is ideal, and it would be almost impossible to overload or underload any motor at any stage of manoeuvring.

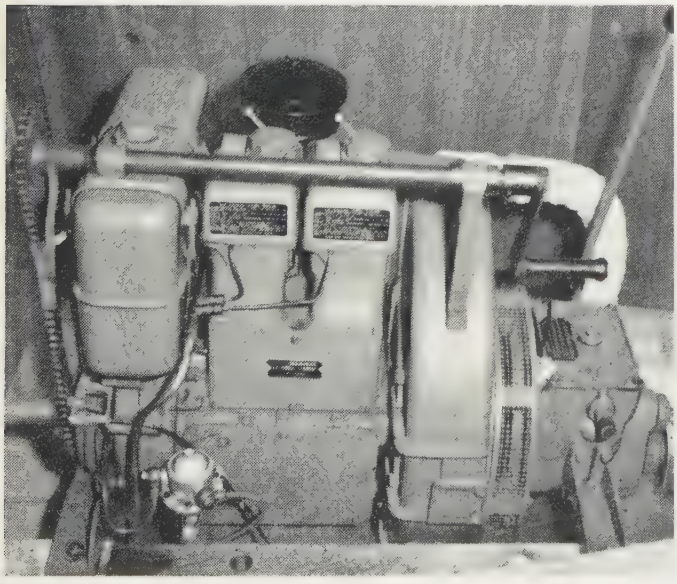
Starting Sometimes A Problem

In the small horsepower field, starting is sometimes a problem, due to the fact that it is possible to flood the carburettor and even fill the crankcase with petrol. Once this occurs, starting is an arduous business as the method of turning the engine is usually by means of a belt (of leather) wrapped around the flywheel.

A good smooth starting handle is an advantage, especially if in a raised position. All electrical equipment should be tropic-proofed, and the wise operator will always carry a spare magneto and spark plug.

One very important point to remember when buying and subsequently operating a small two-cycle motor is that such a motor depends on its crankcase compression for efficiency. If this compression is lost the engine will operate (if at all) very poorly indeed.

The manufacturer provides for this possibility by fitting two grease cups at the two main bearings. These cups carry the grease to the bearings, sealing the crankcase against leakage and preventing undue wear. Badly-worn bearings do not pay on any engine, least of all on two-cycle motors.



This British-built Lister air-cooled marine diesel with engine-mounted fuel-tank (Model LD2) is designed specially for ease of installation. It develops 7 b.h.p. at 1800 r.p.m. A smaller model, the LD1, develops 3½ b.p.h. at 1800 r.p.m.

The Outboard Motor

And now, having discussed various features in different types of small marine engines, what of the outboard motor? Here is a most useful member of the marine propulsion family. It is light in weight, readily installed on almost any small craft, economical to operate, almost fireproof, most efficient in performance and relatively cheap.

Maintenance is comparatively easy, as this can be carried out under ideal circumstances away from the boat on a properly-constructed stand. The engine can be kept stowed away under cover when not in use.

Needless to say, there are dozens of different makes, all with "exclusive" features. When making a selection always remember that the sea is just as hard on an outboard motor as any other type, so

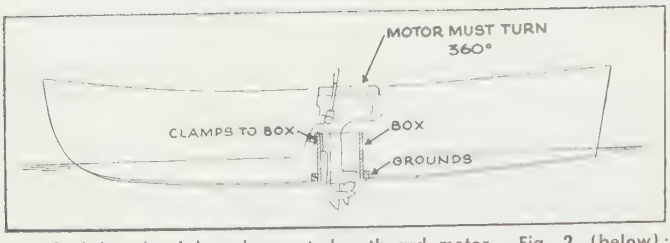
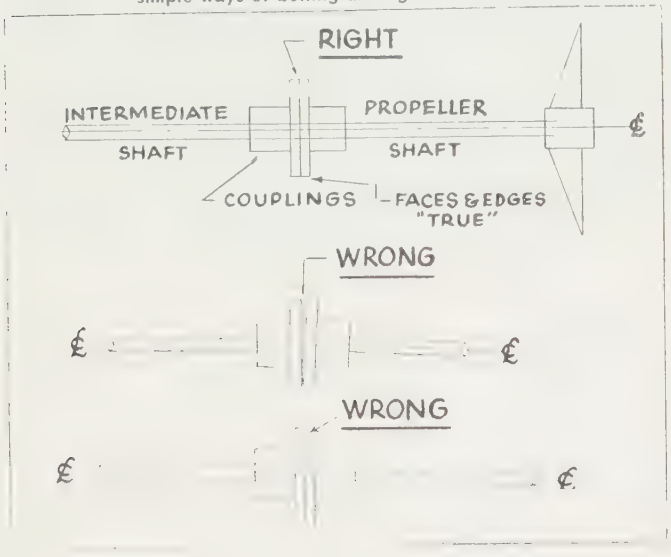
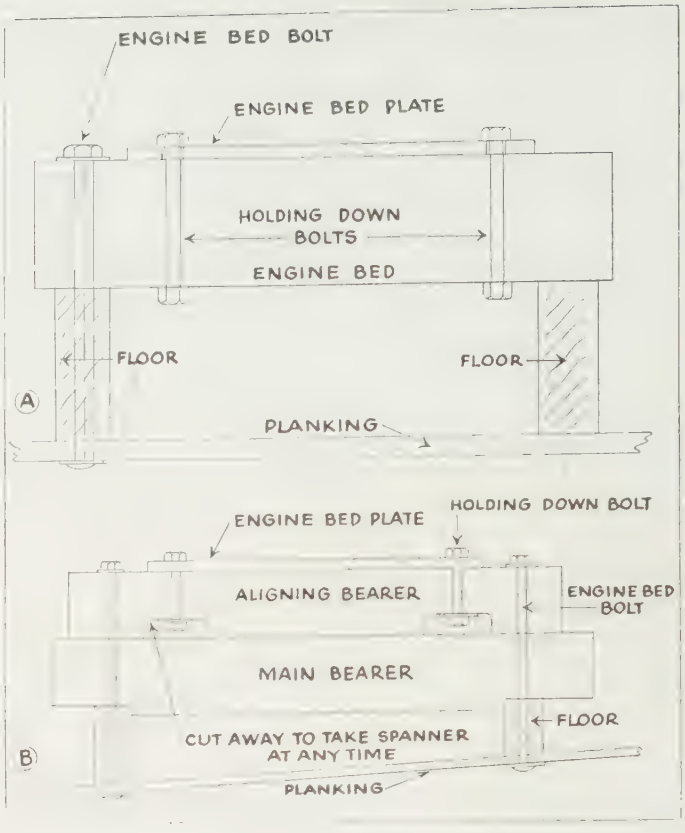


Fig. 1 (above): Inboard mounted outboard motor. Fig. 2 (below): Accurate shaft alignment is of vital importance. Fig. 3 (right): Two simple ways of bolting an engine to its beds.





that it is good policy to select the rugged model built to resist the corrosion that goes with salt water and the breakdowns in the electrical system that are only avoided by those skilled in specialized outboard motor manufacture. Too many "gadgets" can become unnecessary liabilities.

In passing, it is interesting to note that a new addition to the outboard field is a 7½ h.p. diesel motor, in both air and water-cooled models. The fire hazard is, of course, reduced as well as fuel bills. This new engine is a product of the United States, where the outboard engine is leaping ahead in popularity.

Installing An Outboard

The usual method of installing an outboard motor is simply to clamp it on to the transom or stern of the boat, and leave it at that. There are, however, many other ways to instal these versatile motors—one at least of which is very useful, provided the boat remains in reasonably deep water. The rough sketch gives some idea of just how this suggestion can be employed (Fig. 1).

By this means the motor may be used for *any direction* of propulsion, including reverse, simply by rotating the whole unit whilst it is installed in an over-size "centreboard" box. An ideal position would be slightly aft of amidships and to one side of the keel—so as not to weaken the vessel by trying to position the motor on the centre line of the boat.

The author has used this installation on several occasions, with marked success. Needless to say, the outboard motor in question must be capable of being turned completely around in the box. In other words the motor head (complete with tank) rotates with the shaft and propeller through 360 degrees.

One feature of the outboard motor which lends itself to efficient propulsion is the usually excellent ratio between engine revolutions and actual propeller shaft revolutions without any undue weight in the reduction gear drive.

The engine usually 'revs' at a very high rate—whereas the propeller shaft turns at just the right speed to suit the usually excellent propeller supplied complete with the engine. The whole unit, however, could possibly be very inefficient if a lightweight motor and high 'revving' propeller were installed on a heavy, slow-moving hull. For this reason always remember that a heavy, slow boat uses a slow-turning propeller with the maximum diameter, whereas a fast, light vessel can efficiently use a smaller diameter propeller at higher propeller revolutions.

Many outboard manufacturers offer optional propeller revolutions and diameters, as well as long or short drive shafts.

Speaking of actual speed, one good formula is:

$$V = \sqrt{L} \times \sqrt[3]{\frac{1000\ P \times C}{D}}$$

When V = miles per hour,
L = length of boat on waterline,
P = actual shaft horsepower,
D = weight of boat in pounds,
C = a figure varying between 1.0 to 2.5, according to whether the boat is a heavy or light weight vessel. (For a heavy weight boat use 1.0 to, say, 1.6, and for a lighter boat 1.6 to 2.0. For a very light weight boat use from 2.0 to 2.5.)

In passing it might be useful to note that in the formula just given, reference is made to *shaft* horsepower. This is the actual power delivered by the engine through its various components to the propeller. It is not the *rated* horsepower, which is usually higher than the shaft horsepower and which can be very misleading unless taken into proper account.

Every engine produces a certain basic horsepower at peak revolutions. This horsepower should always be checked against certain losses, incurred by the addition of gear boxes, reverse gear units, generator or similar additions to the actual engine. So in order to be sure of the power given at the propeller, always remember to enquire regarding the *shaft* horsepower as against the stated horsepower.

Installing Marine Engines

The installation of any marine engine is a vital factor in helping the engine to operate efficiently. First and foremost

(Continued on page 53)

Pacific Island Peoples To Meet In Rabaul

Malaguna, near Rabaul. The buildings of the Malaguna Technical Training Centre, where the Conference will be held, are in the middle foreground, left of centre.

Every three years since 1950 the South Pacific Commission has brought together representatives of all Pacific territories in its area to discuss common problems, exchange ideas, and suggest ways the Commission can best help their peoples. The next such meeting, the fourth South Pacific Conference, will open at Rabaul in New Britain on April 29. Over seventy delegates from nineteen Pacific territories are expected to take part. In this article a well-known Australian journalist records his impressions of the second and third Conferences, which he attended.

By C. E. SAYERS*

THE approaching fourth meeting in public conference of representatives of the Pacific islanders advances a stage further the experiment that was begun almost ten years ago.

This South Pacific Conference will meet at Malaguna, near Rabaul, from April 29 for about two weeks. The sessions will be held in the buildings of the Malaguna Technical Training School, where the delegates and their advisers, observers and officers of the South Pacific Commission—the sponsoring and convening organization—will be quartered.

Previous Conferences were held at Nasinu, near Suva, Fiji, in 1950 and 1956, and at the Commission's headquarters in Noumea, New Caledonia, in 1953.

The progress made by the islanders in discussing and considering action on problems that concern their social and economic welfare can be really appreciated only by those who have been on-the-spot observers of this meeting over the years.

I attended two of the three Conferences so far held—Noumea in 1953, and Nasinu in 1956—as journalist and commentator, and as opportunity has offered between whiles I have watched with interest the effect of the islanders' deliberations at those meetings. It is with continuing interest that I look forward to being at Malaguna Conference this year.

A study of the record made of the First South Pacific Conference held at Nasinu in 1950, not so very long after the South Pacific Commission, and its ideal, came into being, shows how tentative was the approach to problems made then. The organisers appeared to be even more nervous of the venture than were the representatives of the islanders, who soon appreciated the spirit in which the Conference was held. Largely because of that the experiment was a success.

I made acquaintance with the Pacific islanders at Noumea in 1953: men and women of the Micronesian groups in the northern part of the region, of Guam, the United States Trust Territory and the Gilbert & Ellice Islands; men and women of Melanesia and Polynesia —of Fiji, Samoa, Tahiti, the Cook Islands, New Caledonia, the New Hebrides, and the British Solomon Islands.

My experience then largely confirmed the impression gained from my reading of the record of the first Nasinu meeting. The impression was strengthened by attendance at the second Nasinu meeting three years ago.

Courtesy And Simplicity

Two impressions abide from that 1953 introduction to the most pleasant of the world's peoples: their earnest courtesy and their sincere simplicity. I have had no reason to vary that impression since; indeed, it has hardened into certainty as my admiration for the islanders and their good sense grows.

Many of the people who attend this South Pacific Conference are, of course, sophisticated; western-educated and trained, with thinking and aspirations more attuned to the needs of public debate and negotiation than is so with the great majority of the people they represent. But not all of them, and all of them not all the time.

That was the fascination of my first meeting with them; that is the fascination still.

The Noumea meeting saw gradual fading of the tentative approach to discussion; it also saw disappear the organizers' nervousness, for by then they were satisfied that the Conference would grow in peaceful strength as the years passed.

Guidance of some delegations was still there—perhaps a little too much guidance in some cases. But there was a more positive note in delegates' speeches, more independence in thinking, and in the general approach to the problems set down for discussion.

It was noticeable that peoples of diverse cultures were coming closer together in their thinking, and in the framing of their views on matters that concerned all of them; in instances, only for some of them. Here was a sense of cohesion which was refreshing, for it suggested recognition of common approach to matters that were of common concern, a great advance in a relatively few years when the fact of physical separation because of great distances is remembered.

This dawning recognition of common problems and cohesive approach to their discussion and possible solution, surprised me at the time, as it must have

* Mr. Sayers, who has had extensive journalistic experience in Europe and South East Asia, was Director-General of the Far Eastern Bureau, British Ministry of Information, during the second World War. From 1947 to 1950 he was London Editor of Australian Associated Press.

surprised many others who saw the delegates meeting for only the second time to talk about each other, and about each other's needs.

It was also rather surprising when their tutelage was remembered; when it was realised that they had come to Noumea under so many different flags; Britain, the Netherlands, France, the United States of America, Australia and New Zealand, so that their approach to problems must be differently coloured, and their discussion of them differently accented.

But that was not so, really. As the discussion of the agenda items listed under the three general heads of economic and social welfare and health developed, it became apparent that there was a similarity of outlook and needs in both subject and emphasis.

A vividly-remembered finale of that Noumea meeting was the firm view of delegates from all the Pacific territories represented that there should be as little interference with the good things in their ancient cultures as possible; that the lessons of social advancement, health, hygiene and the care of women and children, and the possible benefits that could come from adoption of some organised economic development, should be taught to the people simply.

There was also in the air a feeling that the people themselves should have a little more voice in the preparation of subjects for future sessions of the Conference, and that perhaps the time was not far distant when the islanders would be given greater control of the machinery of the Conference.

A possible criticism of the first Nasinu and the Noumea meetings was that they were unwieldy; that the full-strength discussion of all agenda items inhibited some delegations, whilst at the same time allowing talk rather than thinking govern decisions.

That was largely overcome at the second Nasinu meeting three years ago, for there was introduced the method of standing committees thrashing out the main subjects listed, before final decisions were made by the full Conference. The agenda items were divided between the two standing committees, one dealing, broadly, with economic questions, the other with matters of social welfare and health.

This was a decided advance in experiment. It succeeded admirably, again largely because of the good sense of the delegates.

Observers were impressed by the skilful handling of the committee proceedings by chairmen chosen from among the delegates—a young Fijian, Ratu Mara, Prince Tungi of Tonga and, when other engagements caused him to leave Fiji before the Conference ended, Mrs. Untalan of Guam.

This was, indeed, a justification of the Conference sponsors, and of their belief that only benefit could come from bringing together every three years, representatives of the Pacific islanders.

The Conference delegates themselves said they were convinced of the success of this working procedure, and they recommended its use at the forthcoming Fourth Conference.

What of this Fourth Conference? In the past three years the matters which concerned the South Pacific Commission and its affiliate body of experts, the Research Council, have been cut back to those most likely to benefit the peoples of the Pacific region. This "streamlining" will doubtless have had an effect on the Commission's deliberations.

There will be much to report by the Commission and its expert officers in the fields of fisheries, co-operation, health and hygiene, pest control and the introduction of farm plants and methods.

It is expected that delegations will come from at least sixteen territories of the South Pacific. Many of them have been studying the problems and the needs of their people, through the agency of special groups, since the 1956 Conference was held. From these studies is expected to emerge an even more positive contribution to discussions and decisions than has been the case so far.

Some of the delegates will be new, some will be attending their second or even third Conference. They will be the guests of a territory that holds great interest for the whole Pacific region.

New friends will be made at this coming Conference, old friendships will be renewed. To paraphrase the words of a delegate to the Third Conference: "Strange names on paper will become real live persons; resolutions and reports on paper will take on the aspect of very real, living matters".

For my part, the fortnight's sojourn at Malaguna promises to be another worthwhile chapter in an enriching social experience.

Modern Pig Raising

(Continued from page 44)

partment of Agriculture. Permanent running rails are set in the concrete pathways between the lines of pens, and along these trucks are pushed carrying the pigfoods from the large vats in which they are boiled by high-pressure diesel burners.

The pigs are provided with a balanced ration worked out by the analysts of the Department of Agriculture. In the main it consists of a mixture of rice bran, slaughter-house offal, coconut meal, corn and vegetable refuse. Feeding costs are kept reasonably low because the Company can provide protein cheaply through medium of their slaughter-house offal.

The piggery is kept scrupulously clean. Water is pumped directly from a nearby creek through overhead pipes and it is run off along wide concrete drains beside the pens. Hosing down under high water pressure is conducted twice daily. As a result of the attention to cleanliness the incidence of kidney worm (*Stephanurus dentatus*), common among pigs in Fiji, is negligible at Naboro.

The incidence of tuberculosis is also negligible, and this can be attributed to the fact that the management has followed veterinary advice and confined itself to breeding its own stock. Introductions are made only from known reputable sources.

At the outset, the aim was to produce up to 100 pigs per month for the market, and this goal has been reached. The Company is also supplying pigs to other butchering establishments.

Pigs Mainly Large White

There is sufficient space available for raising approximately 1,500 pigs. The majority of them are of the Large White breed. The proprietors have aimed at the best quality and in the early stages they obtained boars and gilts from Department of Agriculture farms. A Large White boar which had been awarded third prize at the Sydney Royal Show, was purchased in Australia and has become one of the leading sires in the piggery. Breeding is not confined to one variety alone but regulated cross-breeding with Tamworth and Berkshire breeds is also being carried out. The results are being carefully watched by the Company and the Veterinary Officers of the Department of Agriculture.

Large Scale Poultry Raising Next

The Company also carry a number of cattle on the hill land, and a start has been made with raising fowls, ducks and geese. Poultry raising on a large scale is the next project planned by the Company. In this, as with the establishment of the piggery, assistance will be given by the Veterinary Division of the Department of Agriculture.

New Hebrides Fishing Company Makes Fish Flakes

Fish flakes can be prepared with a minimum of equipment, skill and effort, while their high food value and excellent keeping qualities are well recognised.

The South Pacific Fishing Company of Santo in the New Hebrides has found this product a practical solution to one of their minor problems. The company freezes tuna for shipment to the United States and prepares cooked and smoke-cured fish for export to Japan.

Left over after the species and grades of fish needed for these purposes have been selected are fairly large quantities of good fish quite suitable for human consumption. An obvious answer to this threat of wastage was the commercial production of fish flakes. After recently completing tests, the company has announced it can offer this product at 4/- Australian per pound f.o.b. Santo.

A coconut nursery in Western Samoa. Contrary to popular belief, Dr. Harland considers that the selection of seedlings for vigour and rapid germination is far more important than the selection of high-yielding mother palms as a source of seed-nuts.

A New Approach To Coconut Selection

In an article published in BULLETIN NO. 15 *issued by the Ceylon Coconut Research Institute, Dr. C. S. Harland proposes certain new principles in the field of coconut improvement by breeding and selection. These are discussed below by . . .*

JACQUES BARRAU*

UNTIL recently, coconut selection has generally been based on the selection of mother palms. The practical criteria used are now well known in the South Pacific area since Mr. W. V. D. Pieris, former coconut specialist at the Commission, has emphasized the importance of this technique in his booklet *Wealth from the Coconut,* published in 1955.

More information on the techniques of coconut selection followed by research stations can be found in an article written by Dr. P. L. M. Tammes, "Review of the Coconut Selection in Indonesia", published in 1955 in *Euphytica* (No. 4, pp. 17-24).

In his study Dr. Tammes quite rightly underlines that—"The coconut is an ancient crop, and in the course of years some selection has been effected by the cultivators. Very great differences in yield, as occur in crops which have been introduced in cultivation from the wild state, e.g. rubber, are not found". As a matter of fact a true wild coconut has never been found.

Breeding of the ordinary coconut in Indonesia, as in other tropical countries, has been based largely on the selection of good mother trees. Nevertheless, Dr. Tammes draws attention to the fact that —"The ordinary coconut shows no self-pollination because male and female flowers of a tree bloom at different times". This does not seem to be true for "the dwarf coconut with small fruits and early fertility. These varieties are self-pollinating as a consequence of the simultaneous bloom of male and female flowers on one tree. These trees are almost stable owing to this self-pollination".

As for the ordinary coconut, Dr. Tammes writes that the selection of mother palms has an obvious disadvantage, due to the fact that only the mother tree is known and not the male parent. He adds—"It is obvious that there is more chance of achieving improved production when both parents are known to be high yielders".

Another important point is that, as a result of experiments quoted by Dr. Tammes, "artificial self-pollination with preserved pollen gave indication of the detrimental effect of inbreeding".[1]

To come back to coconut selection proper, here is how Dr. Tammes describes briefly the techniques used in Indonesia in that field:

> "The breeding of the ordinary coconut in Indonesia is based on the selection of good mother palms and the artificial crossing of high yielders. The progeny of these crosses form the so-called primary seed gardens. After thinning, the most productive trees will produce the fruits which will be used for the raising of secondary seed gardens. Attention should be paid to ensure that a fruit variety of different types is included in order to prevent inbreeding".

Quite recently another author, Dr. C. S. Harland, gave some new ideas in the field of coconut selection. They have been published in *Bulletin No. 15* of the Ceylon Coconut Research Institute under the title: "The Improvement of the Coconut Palm by Breeding and Selection".

About the production of planting nuts in isolated seed gardens, Dr. Harland writes that, at the Ceylon Coconut Research Institute—"An isolated seed garden has been provided for, consisting of 200 acres of forest land, with a 50-chain forest barrier to exclude contamination with foreign pollen. Planting has already been started of selected seedlings from controlled cross between high-yielding parents. Subsequently, natural crossing will be allowed to take place, presumably at random, between all the palms of different ancestries in a random assortment of progenies, in order to provide elite seedlings for dissemination".

This was done according to the same principles as those described above by Dr. Tammes. Then Dr. Harland states that, in establishing this type of isolated seed garden, "the assumption was that seedlings obtained in this way would be of the high-yielding capacity desired. *That this assumption is not a valid one is shown by experiments conducted at the Institute.* Some results of growing seedlings from high-yielding mothers, subject to natural crossing, are now known from an experiment conducted by the Botany Division since 1939 and known as the Latin Square Experiment . . . . *From the results it is apparent that high yield is not transmitted by a*

* Plant Introduction Officer, South Pacific Commission.

[1] Incidentally, it may be of interest to note that one of the main studies on coconut pollination was made in the Gilbert Islands by C. B. Trautwein-Dupertuis. The results were published in the French magazine, *L'Agriculture pratique des pays chauds,* in February 1931, under the title "La Pollinisation Artificielle du Cocotier".

mixed group of offspring from high-yielding mother palms exposed to natural crossing. Selected seedlings from high-yielding palms are very little better than those of low-yielding ones".

Dr. Harland explains these rather revolutionary results as follows:

"It must not be assumed, however, that all progenies of open pollinated single mothers are of the same degree of only average merit. It is well known from the work of the writer that open pollinated cacao trees differ in their power of transmitting high yields to their progenies. Some transmit strongly, probably through the possession of an especially favourable combination of dominant genes, i.e. they are *pre-potent*, while others give progeny no better than average. From preliminary results it appears that this situation holds good with the coconut. If progenies of high-yielding mothers are identifiable, it should be possible within a few years to pick out the yield 'transmitters' and use them for propagation, and for intercrossing with each other".

Dr. Harland strongly recommends the use of the Paired Cross Method about which he writes:

"It is possible by controlled pollination to make hybrids where both mother and father are known. Such a cross has been designated as a 'paired cross'. That happens when a *single* high-yielding female is crossed with a *single* high-yielding male. It is clear from observations on other species that families from such crosses differ markedly from each other".

Taking as an example his experiment on maize with the paired cross method (maize being, like the coconut, a typically cross-fertilized species), Dr. Harland states:

"Some of the high-yielding paired crosses gave a yield of more than twice the average. The average yield of the combined paired crosses was about the same as that of the unselected material. Since a proportion of seed from the paired crosses had been retained, it was now possible to make a re-sowing of proved high-yielding pairs, and this resulted in an immediate gain of about 30 per cent. in yield over the unselected commercial material. A further cycle of paired crosses between the best of the paired crosses gave still further increase in yield so that with heavy manuring it reached a level about double that of the original unselected type. It is thus clear that the long-term possibilities of coconut breeding through the use of the paired cross are immense, though the long juvenile period before adequate data is available is an obstacle to rapid progress".

In his article, Dr. Harland indicates some possible means of avoiding this disadvantage, i.e. the use of dwarf palms as females to speed up identification of male transmitters, as dwarf coconut palms come into bearing very early.

A very important point underlined by Dr. Harland, taking into account the immediate and important need for better planting material, is that — "At the present time, a careful selection of seedlings in the nursery for vigour and rapid germination is more important than breeding". This will obviate the fact that the output of improved planting material through the suggested selection method will be very slow for some time.

At the end of his article, Dr. Harland summarized the aims which should be, from now on, those of research on coconut breeding and selection.

It is impossible to enter here into any more details about this very important paper. Although some of the new ideas expressed by Dr. Harland in the field of coconut selection need to be verified by experimentation, one feels in reading this Bulletin of the Ceylon Coconut Research Institute that we are entering into a new era in the improvement of this cash crop.

Already some territories in the South Pacific are following the suggestions put forward by Dr. Harland. This is the case with the coconut improvement programme now in progress in Papua and New Guinea.

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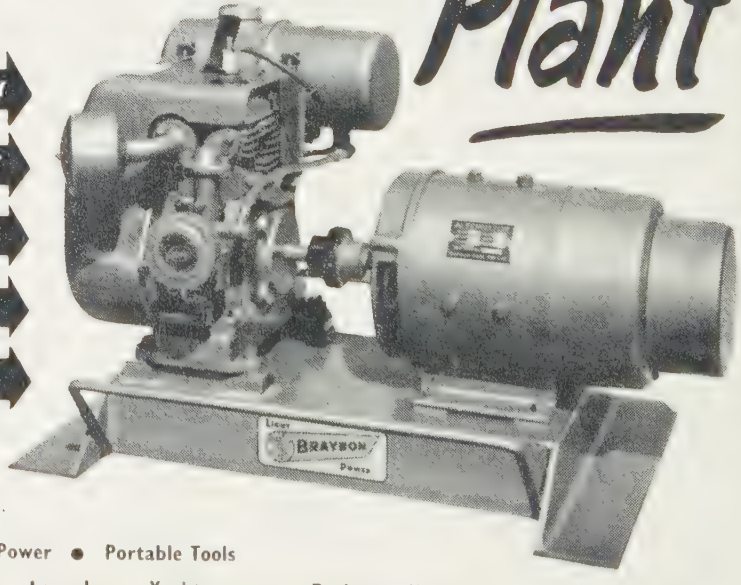

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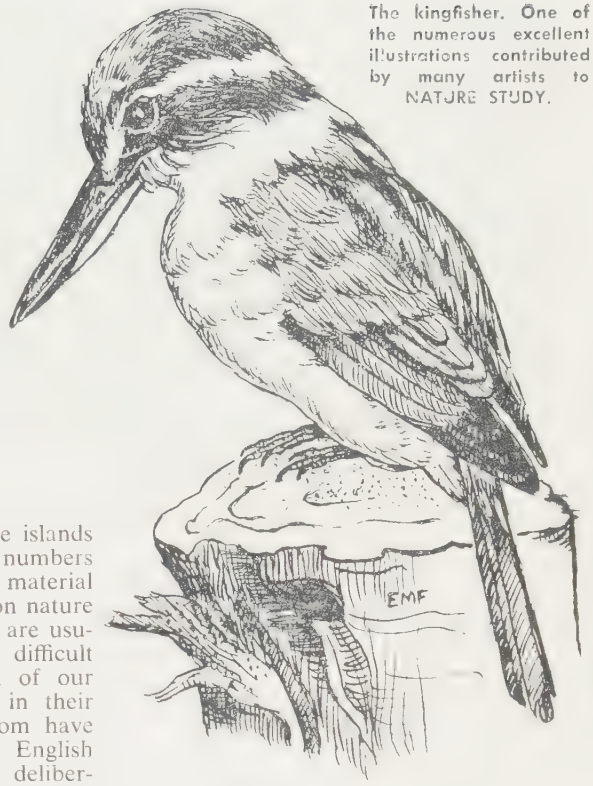
Nature Study . . . *A Handbook*

For Pacific Island Teachers

Though produced primarily for use by school teachers in the Cook Islands, Niue and Western Samoa, this handbook is certain to make a very wide appeal in other South Pacific territories where there still exists a need for teaching materials and texts prepared for local conditions. NATURE STUDY *is reviewed below by . . .*

RICHARD SEDDON*



The kingfisher. One of the numerous excellent illustrations contributed by many artists to NATURE STUDY.

THE publication by the Islands Education Division of New Zealand's Department of Education for the Department of Island Territories of R.R.V. Blanc's *Nature Study—A Handbook for Pacific Island Teachers,* is an event of considerable importance, and one hopes that this book may soon be followed by others equally well-designed to meet teaching needs in the Pacific.

The book's general approach is concisely described in one paragraph of its Foreword:

> "The book is not intended to be a syllabus. It suggests a wealth of material which, it is hoped, will inspire teachers to search for new subject matter. It is a source book for those who lack reference books. It is difficult for teachers in remote islands to find science books in the numbers required to supply all the material needed for a school syllabus on nature study. Then, too, such books are usually written in technical or difficult English. A large proportion of our (island) teachers are fluent in their own language, but they seldom have an opportunity to practise English idiom. This book has been deliberately written in simple and straightforward English designed to convey meaning accurately even to the youngest teacher. Much of it may be translated into various languages and this simplified form will assist translators in understanding readily the ideas intended".

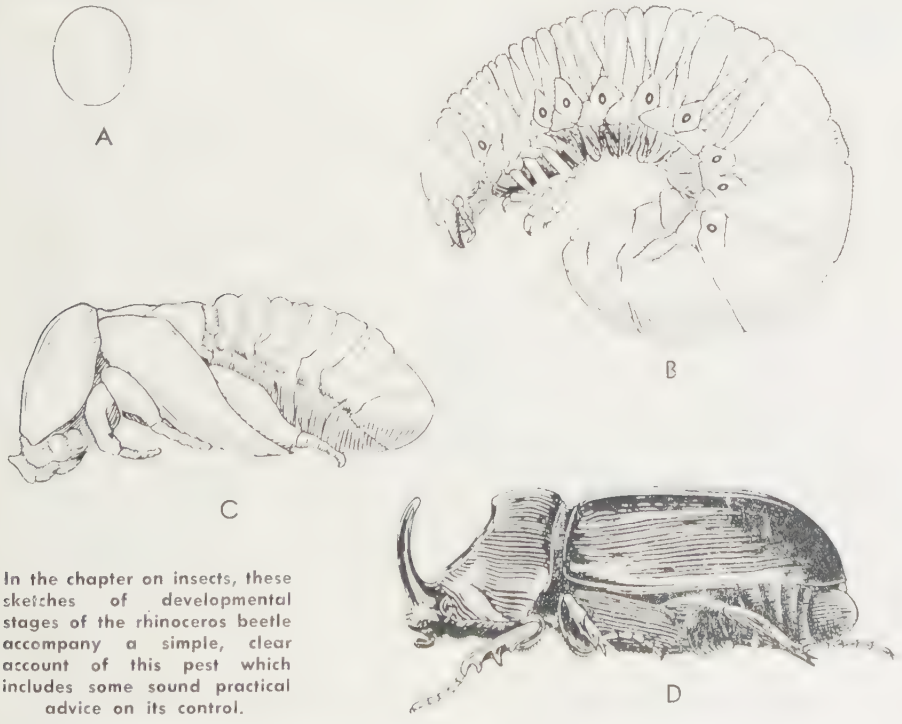
The opening chapters together constitute a most useful and stimulating framework within which effective nature study teaching can be developed.

In "Creating an Interest in Nature Study" the author considers a number of methods by which the child's early interest in nature may be fostered by the teacher who is prepared to do rather more than just answer pupils' questions for them. In "Teaching Nature Study" a most interesting outline is given of the method of team discovery and how it may be organized, while "Lesson Plans for All Classes" is devoted to a series of outline lessons at the various school levels, intended as a guide for less experienced teachers. This section is rounded off with a useful chapter on "The School Garden" in relation to a nature study course.

The main body of the book comprises a further eight chapters devoted to supplying essential and well-illustrated material on Food Crops; Plants and Weeds; Trees; Insects; Other Small Animals; Pool, Stream and Sea Life; Fish and Fish Farming; Birds; and Mammals. Each section includes useful suggestions on observations and activities that might be encouraged to provide answers to the kinds of questions children themselves ask. The final chapter describes apparatus that might usefully find a place on the classroom's nature study table and this is followed by a comprehensive Index.

Two pages of acknowledgements for assistance received testify to the thoroughness with which the author has set about making text and illustration as authoritative as possible, but one feels

*Executive Officer for Social Development, South Pacific Commission.



In the chapter on insects, these sketches of developmental stages of the rhinoceros beetle accompany a simple, clear account of this pest which includes some sound practical advice on its control.

The puffer fish is one of the many illustrated in the chapter on fish and fish farming.

throughout that the major contribution has been the author's own, for he has obviously spared no effort to achieve the aims set for the publication. His own wide experience as a teacher in New Zealand and Fiji, a period spent in Western Samoa as officer in charge of school broadcasts, a continuing scholarly interest in educational developments, and an obvious and knowledgeable enthusiasm for his subject have enabled Mr. Blanc to produce this first-rate book.

Produced essentially for use in New Zealand's island territories of the Cook Islands, Niue and Western Samoa, it is bound to make a very wide appeal in other territories of the South Pacific where the need for teaching materials and texts prepared for local conditions is still very far from being adequately met. Its value as a teaching aid and source book may well be equalled or surpassed by its more general value in showing what needs to be done and how it *can* be done.

One hopes that educational authorities throughout the region will make a point of seeing this book for themselves. Meanwhile, one looks forward with keen anticipation to the next publication of New Zealand's Islands Education Division of its Education Department.

FAO Coconut Study Group Meets In Manila

THE Executive Officer for Economic Development, Dr. A. H. J. Kroon, represented the South Pacific Commission as an observer at the second session of the FAO Study Group on Coconut and Coconut Products held at Manila from 20-29 October last.

The session was preceded by a meeting of a sub-committee on copra quality and grading, which examined harvesting, seasoning, drying, storage, transport and marketing methods and their effects on the quality of copra, the criteria for determining quality standards and standards set up to meet the requirements of copra processors. FAO Agricultural Paper No. 63, *Copra Processing in Rural Industries*, served as the basis of the discussions.

The sub-committee felt that the most important factor in copra quality is the moisture content. It therefore recommended a programme for improving drying practices.

The Study Group reviewed international market prospects for copra and coconut oil. It found that the present firmness of copra prices is mainly caused by a setback in production due to drought in the main producing areas, and the situation in Indonesia. It noted that little progress has been made in

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this century in increasing the productivity of coconut stands.

With regard to the need for fuller international statistics on coconut production, the Group noted with satisfaction that provision has been made by FAO for the appointment of a regional coconut statistician to conduct small-scale pilot surveys with the aim of evolving suitable methods for the estimation of coconut production.

The Group once again stressed the importance of collecting more accurate statistics for the World Agricultural Census in 1960.

The Group endorsed a recommendation made by the technical subcommittee for the appointment of an expert to study the status of coconut research work in the main copra-producing countries, and exchange of technical information. It was considered he should also study the proposal to establish an International Coconut Bureau.

During the session, information was received from FAO headquarters that funds for the appointment of such an expert had been made available as from January 1959. FAO has accordingly been requested to provide an expert for a period of at least two years to make a detailed study of different methods of drying, and different types of driers. It was recommended that at the end of the experimental studies the expert appointed should conduct a training programme for trainees from copra-producing countries.

An exchange of information took place on some of the serious diseases of the coconut palm, more in particular on the cadang-cadang disease in the Philippines, where it has already killed about nine million palms.

The Group recommended a study of diseases of unknown cause.

The Group expressed its great appreciation of the visits arranged for its members by the Government of the Republic of the Philippines, Philcoa and the Philippines Manufacturing Company, which materially aided the technical subcommittee in its work.

It was felt by all participants that this second session of the FAO Group on Coconut and Coconut Products had been a very successful one.

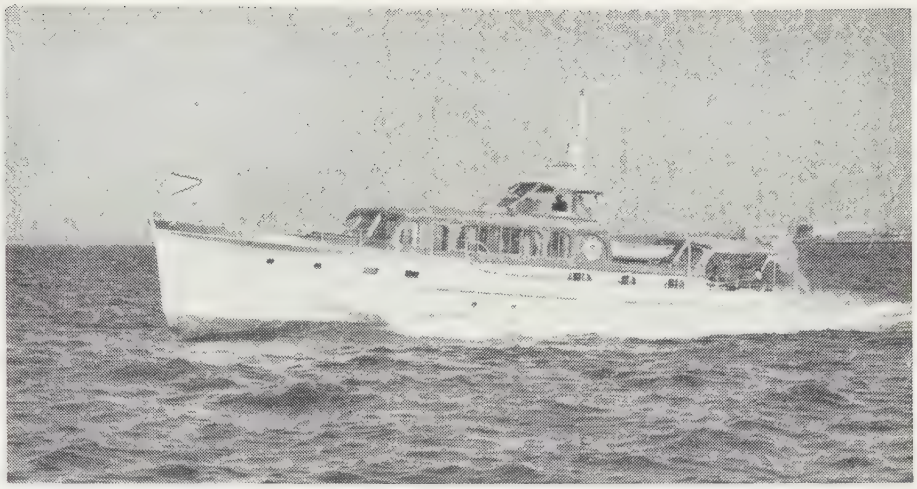
Marine Engines For Pacific Fishermen

(Continued from page 46)

the motor should be in complete alignment with the propeller shaft and the intermediate shaft. All shafting should be "true" and couplings properly machined and fitted. Otherwise undue vibration and wear will occur in the stern tube, reduction gear or reverse gear, with subsequent overheating in the affected bearings.

Once the couplings are correctly fitted it is a simple matter to test alignment. Simply push both couplings up close, face to face. If they fit up snug without

(Continued on Page 64)



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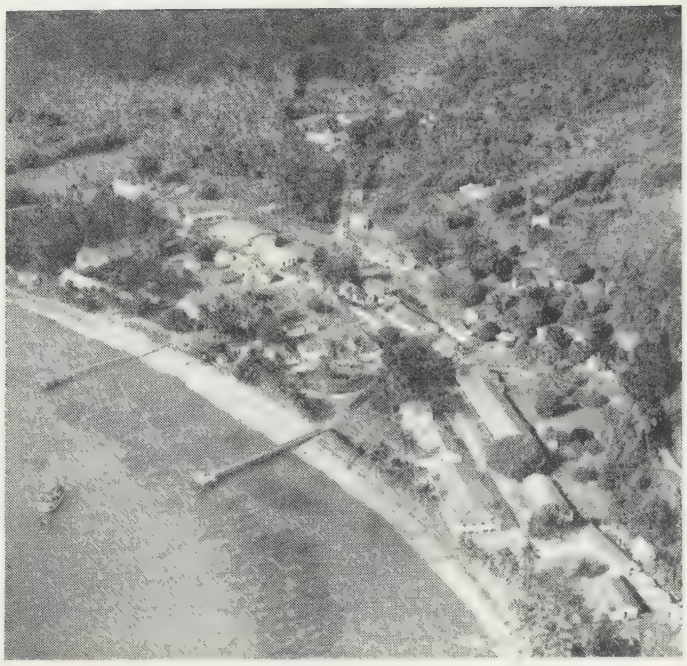


Above: The general hospital area at Makogai. In the foreground are the women's wards and compound; the hospital block, churches, movie theatre, and school are in the centre section. In the background are the Sisters' quarters. Right: Sisters of the Order of Mary, who do most of the nursing at Makogai, waiting for a supply ship to come in.

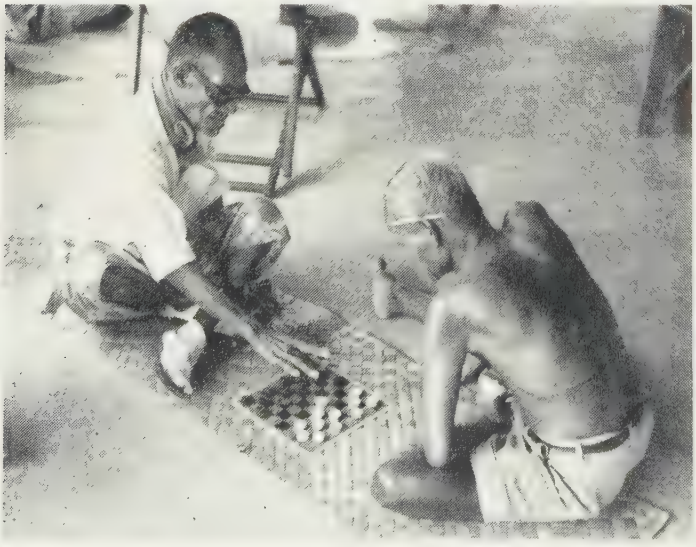
Marked Progress In Leprosy Fight

An encouraging picture for leprosy sufferers in the islands is given in the latest annual report of the Inspector-General of the South Pacific Health Service, Dr. P. W. Dill-Russell. In discussing the future of the leprosy hospital on the island of Makogai he suggests that in fifteen years the need for a centre may have ceased to exist.

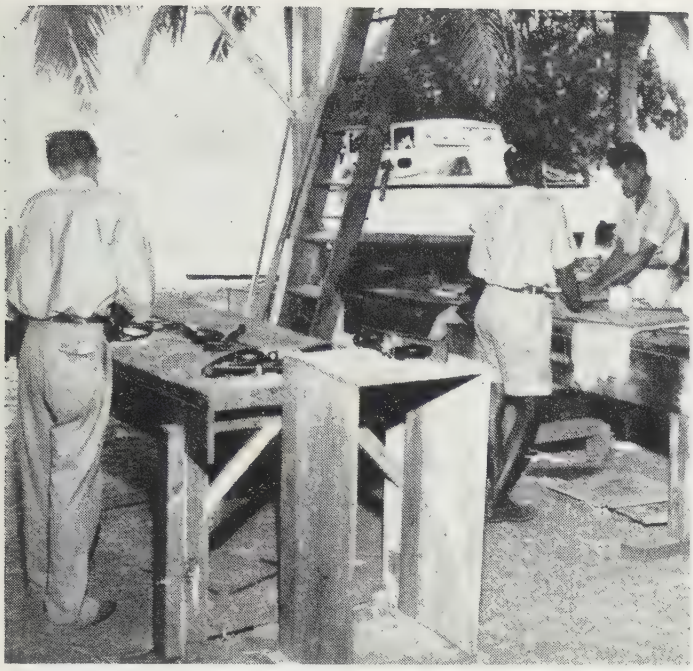
IN his report Dr. Dill-Russell states: "The future of Makogai is difficult to foretell. With improvements in treatment and the increasing tendency to treat cases on an out-patient basis, the need to send patients to a segregation centre has diminished.

"As the number of cases under treatment diminishes and as admissions decrease, more time is available to the staff for early case finding and follow-up. It is more than possible that in 15 years' time, the need for a special centre will have virtually ceased to exist".

The leprosy hospital at Makogai was established in 1911. Patients are accepted



Above: A Tongan (left) and a Samoan who have been patients for some years play a game of draughts. Right: A Sister checks off names as a village headman distributes a ration of tablets to the patients.



Above: Patients working in the carpentry shop. The launch in the background was built by patients. Right: Women patients of all races do much of the sewing for the hospital and for the schools in a room given by the N.Z. Lepers Trust Board.

from all parts of the South Pacific and of the 559 persons under treatment at the end of 1957 almost half were from outside Fiji. They included Samoans, Cook Islanders, Tongans, Gilbertese, Chinese and Euronesians.

Since the hospital's inception in 1911, 3,733 patients have been received for treatment. The disease was arrested in 1,537 of them, 461 were repatriated to continue treatment in their own country and 1,176 died.

Striking Decrease In Deaths

The report records a marked change in the situation since treatment with diamino diphenyl sulphone was introduced in 1948.

It quotes these figures to illustrate the change—

Year	*Admissions*	*Discharges*	*Deaths*
1948	73	52	40
1949	92	48	40
1950	80	37	30
1951	113	83	24
1952	70	57	13
1953	104	84	11
1954	57	65	8
1955	44	65	12
1956	64	114	7
1957	49	38	8

The report describes Makogai as "a happy place". There is an arts and crafts school, training is given in carpentry, metal work and motor mechanics at a technical institute. There are schools for children, and patients take part in sports such as cricket and football. Gardening is popular.

Companies of Wolf Cubs, Boy Scouts and Girl Guides flourish and the island has an excellent band.

Praising the work of the staff, the report says "It is fitting that tribute should be paid to Reverend Mother and the Sisters of Mary whose devotion to duty, enthusiasm and never-failing cheerfulness have made Makogai the happy place it is".

Above: Boys and girls of all races join in the scouting and guiding activities on the island. These are members of the Wolf Cubs. Right: School girls being served with a meal which they will eat in a communal dining room. Girl at left is Fijian, and the other three are Samoans.

Above: A remarkable combination of new and old styles and materials—an architectural monstrosity in Apia. The "fale" part is the actual living and sleeping area. Right: Traditional Samoan round house in background is high-ceilinged, cool and well ventilated. Unattractive "modernized" fale in foreground is a mixture of style and construction. Corrugated iron roof means an unpleasantly hot interior.

Housing Problems In The South Pacific

The importance of providing for adequate light, air, living space and sanitary facilities in houses designed for tropical conditions are stressed in this article.

By T. C. LONIE*

THE building of a house is man's response to the need for shelter from the elements—sun and rain, heat, cold and wind. It provides him with safety in greater or less degree from man or beast, and with privacy and a place wherein to bestow those things of which he has no immediate need. All else is but an added convenience, such as a handy water supply, a cooking place, and a place wherein he may attend to the needs of nature.

It follows that this house or shelter must, in its primitive state, reflect the magnitude and relevant importance of these primitive needs. Climate is clearly a major determining factor. If wind and storm and rain are frequent, then the house must be fit to stand against them, or at least able to be cheaply renewed should catastrophe occasionally overtake it. If temperatures are normally mild, there is no need to keep out the cold; in fact, free access for cool breezes may be desirable. If sun and glare are likely to be fierce, then shade must be adequate.

If enemies or wild animals threaten, then access must be to that extent secure.

*Dr. Lonie is Public Health Officer, South Pacific Commission.

Above: Fijian "bure" on island of Serua, made of traditional materials with permanent walls. Note cable to strengthen thatch roof. Lighting and ventilation are likely to be inadequate, especially at night. Right: Interior view of the "bure" at left, showing solid roof construction.

Old-style round house near Kone, New Caledonia, with high-pitched roof, small door, and very dark, poorly-ventilated interior. Right: Main street in Tieta. Houses have rammed earth walls, whitewashed, with thatch roofs.

which is of course the reason for building some primitive houses in trees, and one of the reasons for building them on high posts well above ground level. Others are that the houses should be above water or flood level, and that the floors should be dry. Where there is little timber, and danger from foes is slight, a dry and well-drained floor is often obtained by building the house upon a platform of volcanic rocks, or coral, and securing a smooth floor by a filling of coral chips, shells and sand.

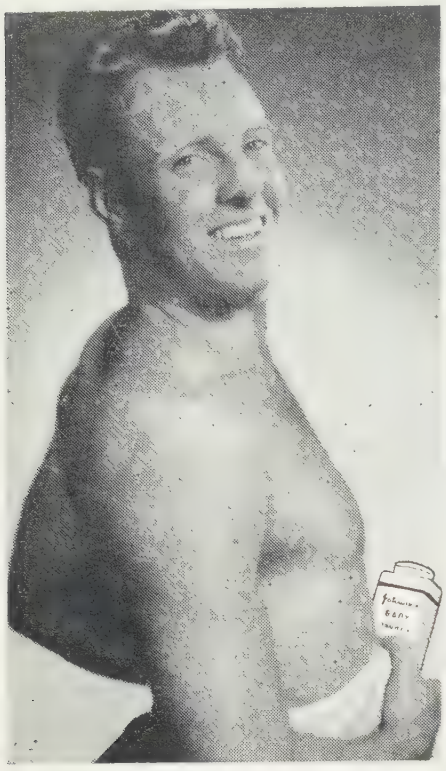
From such beginnings as these in all countries—and depending on the building materials available locally and the tools with which to fashion them—springs the basic pattern of housing.

However, this basic and primeval pattern is indeed rare. For reasons of choice or necessity, man is or becomes a gregarious animal, and the house providing for one family may become the home of several related families. This single-house arrangement, having manifest social deficiencies, becomes in due course the village of several homes, to which are added the houses of other persons of the same tribe or group keeping close to one another for security or convenience.

The social consequences of village life, and the frictions and stimuli of even slightly-different attitudes to life and living, affect house building from time to time. The needs for privacy between the members of a family, and between families, calls for the provision of various forms of screening of parts of a house from each other, and from other houses. Partitions and walls are a natural consequence, and become more elaborate as the means to make them become available.

In the earliest times possessions of any kind were extremely few and tended to be held in common. In fact, the fruits of the labour of one became the property of all and not of its producer, who in fact because of status might fare very badly in this respect. Eventually, however—though by no means completely even now—possessions became the property of the family, then of the individual. Since houses are not in the first instance designed to secure individual possessions from the use or

Above: A tropical slum. Living quarters of an Indian family near Suva. Right: "Bure" type dwelling occupied by an Indian farmer and his family, between Lautoka and Ba, Viti Levu, Fiji. While the walls are made of flattened oil drums, due to the thatch roof the house is not very hot in summer.



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cupidity of others, a very early individual acquisition is that of a box wherein to keep them, and for greater security an early acquisition for a very long time has been a box which can be locked. The locked box precedes the locked house.

Much as we may bemoan this growth in individualism—perhaps we might say selfishness—its inevitableness cannot be seriously contested, and must be accepted as the present normal pattern of living. In respect of housing it is of course fundamental that we appreciate this and correlate our thinking not to the past but to the present, and even more to the inevitable consequences of economic and social change in so far as it is bound to be reflected in housing needs and standards.

The worst housing problems arise, not in the adoption of new methods and procedures or the acquisition of new conveniences and facilities, but in the failure to match the discarding of old methods and circumstances with the sanitary and aesthetic standards of the new.

Town And Village Planning

Concepts of village planning are not new anywhere in the Pacific. Most traditional villages, with greater or less completeness of detail, conform to a pattern of some regularity and even of some rigidity. Usually space about houses is adequate but not excessive. Whenever it appears that traditional patterns are likely to become swamped or disorganized by population growth, or require re-organization in the light of the requirements of sanitation or health, some sort of plan should be laid out, as simply as possible but capable of development and alteration to meet changing needs.

It may seem that this is obvious. It is nevertheless a recurrent experience that schemes of re-settlement and re-housing have been blasted from the outset because health needs and circumstances were ignored. A village on an outlying island had to be evacuated to the mainland, and a site was chosen by administrative personnel of later persistent anonymity. The local department of health was not consulted. After land had been appropriated and a large amount of money spent, the new village was inaugurated with some ceremony. It was then found that no satisfactory water supply could be secured at or near the village, and that drainage was not only difficult but in local circumstances virtually impossible.

It is unfortunately not only lack of facilities which may bedevil such schemes. In countries and areas where malaria-carrying mosquitoes are a menace to public health, the bad siting of a village may, as has often happened, expose a new, uninfected population to all the hazards of a tragic malaria epidemic.

In every one of these instances there has been a failure on the part of the planners to make use of professional knowledge of preventive medicine, and local knowledge readily available.

House Planning And Structure

If mains water supply and drainage are provided, more of the site may be built on, but light and air through and round dwellings must be safeguarded. These points become important when a village area begins to be built up into a town. It is as well not to lay up future troubles by permitting a low standard of hygiene in new houses. Some authorities say that at all events not more than half the site should be built upon.

As soon as the self-contained village life begins to break up, and people work for wages or live away from their villages, there develops a scarcity of traditional housebuilding materials and an increase in their price. Housebuilding, which has always been a community effort, ceases to be so because much of the village labour which could be called upon to undertake it has either left the village, or is in regular paid daily employment and is, in either case, not available.

Of course this trend is not universal, but it is sufficiently widespread to make it doubtful whether we may hope to maintain indefinitely the use of such traditional materials, which are often attractive. They are part and parcel of a way of life which is disappearing. Indigenous peoples themselves, while they may pay lip-service to the old ways, do not in their own homes do much to maintain them if they conflict with convenience and utility.

However, where traditional materials are being discarded we ought to encourage their replacement by those which are, as far as possible, of good appearance and of real utility and durability.

A point to remember in all tropical housing construction is that if walls are insufficiently thick to insulate the contained rooms—and in any case for all window openings—there should be adequate eaves shelter, with or without a verandah, to keep the morning and afternoon sun off the walls. Architects from temperate climates where the sun is less intense and shines less frequently, and is therefore more desirable, often forget this essential feature.

Walls of traditional materials and construction tend to be cooler than most modern forms.

Roof ventilation is an often-forgotten feature where modern materials are used. A thatch roof is usually reasonably well ventilated, but this depends upon the type of thatch, the manner of laying it, and its age. If something else is used the roof construction should permit circulation of air, and this means the provision

Above: Labourer's dwellings of poor type, New Guinea goldfields. Note walls of corrugated iron, no windows apparent, ventilation poor. Right: Modern bungalow for skilled labourer's family at Wau. Size appears adequate, but shallow front verandah provides insufficient shade.

of adequate inlets and outlets. This can be arranged without great difficulty if considered at an early stage.

Rooms under iron roofs especially need ceiling, and this should be at an adequate height.

Floors if of solid construction should be built up on a plinth sufficiently rigid and well drained. Otherwise they will crack and will be damp. The general desire of those who live in such houses is to replace the pebbles, shells, sand or coral surface by a skin of concrete for ease of cleaning and maintenance. Those who advocate retaining the original type of floor do not usually live in such houses, or are not responsible for maintaining them.

Floors raised on piles will probably be of wooden planks in modern houses. They should be sufficiently raised to be easily accessible from below, as otherwise they will harbour vermin, especially rats.

Split bamboo or palm stems and similar flooring of traditional material tends to be very perishable, insecure and harbours dirt, being incapable of proper cleaning. Its only virtue is its necessity in the absence of something better.

Window openings do not usually need to be glazed unless weather conditions demand closed windows to keep out rain or wind. However, shutters should be louvred if it is necessary for them to be closed at night, or frequently for any purpose. The openings should be sufficiently large.

Sometimes houses built on piles have the tops of the latter provided with a guard in the shape of a sheet of galvanized iron or other metal to prevent access by rats or termites. This is excellent—provided it is not negatived by the provision of a staircase from the building to the ground.

The Rooms Of The House

While the simplest house consists of a single room, that basic pattern is quickly departed from, and within broad terms of reference a house must be considered as having individual rooms for individual purposes. Those which are of major public-health importance are bedrooms, kitchens, toilet and washing rooms or facilities, and utility or living rooms.

Much that is written by house planners about bedrooms or sleeping rooms seems to overlook the matter of space in relation to health and the spread of

Above: A very poor type of dwelling built entirely of corrugated iron. Manokwari, Netherlands New Guinea. The small shack is a "Roemah Kotor", or child-birth house. Right: This house built over the water on Lake Sentani, Netherlands New Guinea, is cool and well ventilated.

disease. Here, consideration of the cost of placing all possible facilities within an overall floor area seems to override all other matters. Most of the plans for "low-cost tropical housing" seem to ignore the question of the size of the house in relation to the size of the family, and many type plans are of dwellings which for this reason alone would commence their career as unhealthy slums, and would become even more unhealthy as the years went by. Overcrowding and the spread of disease, especially respiratory and skin diseases (tuberculosis and scabies, for instance) are intimately related, and the best-constructed bedroom with too many people using it may be just as dangerous as a more poorly constructed one equally overcrowded.

Where there is housing legislation there is usually a prescribed standard of space per person. Originally emphasis was on cubic space, but it is now generally recognised that this can be a very false standard, and since there is generally a minimum height of room, either of necessity or by regulation, the important requirement is that there should be adequate floor space.

In relation to this, practical considerations usually call for two standards. One is a bare minimum standard for houses already erected and in use, the other is for houses proposed for erection. In the first instance, certain rights of occupancy and ownership have already been established. Moreover, houses are not new, and if sub-standard will tend to disappear within a limited time. They may in fact have complied with legal standards applicable at the time of their erection.

New housing, on the other hand, must represent the highest practicable standards at the time of erection. The minimum requirements must be practical, reasonable and real, with a special note to the effect that they *are* minimal. They may be varied upwards but never downwards.

Provided floor space per person can be maintained at a reasonable and common-sense level, we can probably leave the question of the proximity of persons using the room to their private convenience, so long as by our general health education we can inform them of the dangers of too close proximity in the spread of disease.

Ventilation And Lighting

We now consider ventilation and lighting. In the tropics, it is not necessary in either case to provide all of this by conventional window space. In many places it is the practice (and could be in others) to leave a space between the top of the walls and the ceiling or roof, either filled with open lattice-work or quite open. This improves ventilation but of course at some expense of privacy.

Finally, mention should be made of the fact that some fittings for clothing and other purposes must be provided in a bedroom. We may economise on usable floor space, and incidentally improve soundproofing by using party walls between rooms for the provision of such fittings. This is quite easily arranged and at little cost.

Kitchen And Service Facilities

Let us now proceed to consider kitchens and the facilities to be provided within them. There are many reasons why in the absence of modern cooking methods, adequate water supplies, etc., kitchens should be permitted to remain as detached and somewhat elementary buildings. Nevertheless, it is interesting to see how even in remote places and in poor circumstances there is a move towards the elementary amenities. As soon as the plate and the cup appear, water supply and drainage become matters of significance!

Clearly this must be so. If a leaf forms our plate it is simply discarded after use. The coconut cup or the gourd has a limited life and is in any case not permanent. The earthenware cup and the plate belong to another world entirely. They are expensive, scarce, and therefore to be preserved with some care. They demand to be washed, which calls for a water supply of some kind, and if the waste water is of any significant amount it must be conveyed away from the dwelling by a drain.

We may think that the kitchen table and the draining board are highly sophisticated articles, and they may be in some circumstances. But in their essential form—and made of what materials happen to be at hand—they quickly follow the plate and cup, and of course the knife and spoon which go with them. An observant walk through most island villages will support this assertion.

Kitchen requirements must then take account not only of existing and continuing methods of cooking, but also of the types of cooking and handling of food which are associated with the modern cooking pot, the cup and the spoon; with boiling, in fact, rather than baking.

Stone oven cooking, except for ceremonial purposes, is on the way out. It doubtless originated because neither the art nor the material for pottery existed in its countries of origin. In many communities there simply is not time or available labour to make it feasible for everyday use. So cooking over a fire, or preferably on a stove, will inevitably replace it. Again, for protection and convenience, the fireplace or stove should be in a kitchen with suitable precautions against fire and to provide for exit of smoke.

The sides of the kitchen may be open or closed as weather or convenience may demand. A roof is of course a necessity. Whether there is a piped water supply or not, some sort of sink and draining board should be provided. Drainage from the sink must be conveyed away by some sort of drain, either to a common system, or to a soak pit, as conditions may allow. It should not be too difficult to provide some sort of gully or drain in cement—at the point of discharge of the waste pipe at least. Otherwise the soil will become eroded, sullage water will collect, and a nuisance will be created.

Every attempt should be made to pave the kitchen area with a solid cement floor. It is otherwise impossible to keep in a sanitary condition.

The fly-proofed food safe has proved very popular in the houses of village peoples. New housing should certainly provide it. Provided facilities are well arranged, and other provision is made for storage of fuel, etc., the kitchen need not be large: 80 square feet is a size suggested by some authorities.

It would be convenient to incorporate in the same structure as the kitchen, facilities for bathing and the washing of clothes. A cement floor is again necessary, and this should have drainage away from the building. A two-tub unit for the washing of clothes would be of great assistance to the housewife, and should not be difficult to provide for. What can or cannot be insisted upon in the way of washing facilities depends of course very greatly upon the type and adequacy of water supply. Where there is a piped supply, quite clearly a much higher minimum of equipment and facility can be insisted upon, but the minimum specifications given above can apply even where a piped supply is *not* available.

Costs can be reduced in circumstances such as those mentioned by pre-cast concrete units capable of being set in a party wall and providing kitchen sink-draining board facilities on one side, and laundry tubs and personal washing sinks on the other, with a common drain unit. These are a feature of low-cost housing in some areas, and in the absence of really competitive private enterprise, governments could contribute to housing improvement by providing such units at cost.

Living Room

Some sort of room suitable for communal living apart from cooking or sleeping needs to be provided for. Its size is not likely to be a matter of difficulty so long as it provides room for comfort and for some furniture at least.

Sanitary Accommodation

Essential as it is to any discussion of housing, the question of the types and management of sanitary privies and such equipment really requires an article to itself, and is therefore not discussed here

Water Supplies

A good water supply piped to every house is of course much to be desired, but it raises large problems in many areas. One very great and ultimately crucial argument in certain places against traditional roofings as compared with those of galvanized iron, asbestos, tiles or similar constructions is that the former cannot be used for the collection of water, but the provision of adequate tank storage for houses with modern roofing may largely solve the water-supply problem by providing, if not the whole, at any rate a substantial part of the needs of the household.

Church roof supplies for villages, common in some places, cannot be regarded as a permanent or satisfactory substitute, for reasons which will be obvious. Where they are in use, and form an appreciable part of the supply, control should be in the hands of a civil authority. One can hardly imagine any rational objection to this, and indeed a proper agreement might hold advantages for the church authority as well as for the village.

Some Final Considerations On Housing Policy

The immense variety of conditions from country to country—indeed, often within the same country—lay any commentator upon housing open to the criticism on the one hand that his recommendations are impracticable and unreal, and on the other that they are insufficiently specific and do not go far enough.

Some may even question whether housing is in essence a public-health matter at all, but such a comment only exposes its maker to the charge that he has failed to appreciate that much preventable diseases results, in the last analysis, from the conditions in which people are compelled to live and work, a contention now so well demonstrated and documented as hardly to require discussion.

It is clear that over wide areas nothing legislative or compulsory can yet be done about housing, but guiding principles and general standards should be the subject of teaching and propaganda at all levels, and should be rational and practicable to suit the individual case and place. Change is on the way, and developing ideas should be guided along right lines.

There are, however, some fields in which more positive action could be taken:

1. In the first instance all government housing should be to a standard which ensures so far as possible that, for the first ten years at least, it will satisfy the requirements of health and hygiene in all respects. And these requirements should be authoritatively determined by trained, competent and knowledgeable experts. They should

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not be depressed for any consideration of race or equated to the present habits and ideas of indigenous peoples where these are clearly contrary to healthy and sanitary living. Financial considerations should not have precedence at the expense of essential health requirements. It is better not to pretend to do the job at all than not to do it soundly and well. It is in the long run cheaper, too.

2. Similarly, housing projects by commercial or public bodies should be required to provide the minimum standards adopted by governments for their own housing projects, though no higher minimum standards should be enforced.
3. Developing areas where re-housing is in progress, or new housing is being provided in any quantity, should be declared Housing Development Areas, and standards of building, accommodation, sanitary facilities and amenity should be prescribed and enforced. Roading, section sub-division and size, planning on site, structural requirements, accommodation, etc., will all require to be prescribed—in fact, a code of building by-laws will be needed.
4. Certain built-up areas should also be scheduled, and closed to unapproved new building, and/or to building not in accord with the building code mentioned above. In such areas substantial alteration to existing buildings should be forbidden unless plans and specifications are lodged and approved by the authority.
5. Meanwhile minimal standards lower than for new buildings should be enforced in the case of existing buildings capable of improvement, and steps taken to ensure that other buildings not capable of improvement are closed and demolished as change of tenancy or deterioration permit or require.
6. Wherever a local body controls the affairs of a village, the regulation of building should be part of their function, well combined with their sanitary and public-health responsibilities, and should be carried out through a sanitary and building inspector for an appropriate district. Here also an appropriate code will be necessary, and should be a *sine qua non* for the setting up of local authority control of a village if it is to be recognized by government. Beginning with a few key villages, control can be extended from time to time to other areas, and in all controlled areas the general pattern set out above can be developed stage by stage.
7. Except in the way of general education, and the example of good housing where it exists, it is best not to attempt any real control of housing

in areas where it is not possible or practicable to carry it out properly. The task in the other areas and circumstances mentioned is certainly large enough to engage all the available resources of governments.

Thus a start may be made and a stimulus applied toward improvement. From time to time fresh advances may be made. New areas would be scheduled, and perhaps variable zoning applied to consolidate current attainments as may be found necessary.

Government Or Local Body Subsidized Housing

The greatest deterrent to house building at all stages above the most primitive is cost. Even in conditions where house building for an individual is assisted by members of his own community or village, this voluntary labour has to be paid for not in wages but in the provision of the appropriate—and costly—feasts at appropriate stages.

When a money economy appears, the pattern becomes that which is all too familiar everywhere. House building requires capital which a wage or salary earner starting from scratch cannot command. The alternative is the private enterprise rented house which in the nature of things must always be dear in a free market.

Finally and, as it would now seem, inevitably, comes public-body subsidized housing and its close relatives, community co-operative schemes, workers' housing subsidized by employers, and building societies of varying sorts, and providing for everything from free housing for beneficiaries to those financial arrangements which spread and ease the burden, especially in the initial stages, but require full reimbursement eventually.

It is not to be expected that Pacific island territories can escape these eventual solutions or means of amelioration of their housing problem. The matter is not so critical for them yet, but it is already an acute problem in the islands of the West Indies which are in some respects comparable, and it should be engaging the thought of Pacific island governments as well.

Conclusion

This paper does not pretend to deal with technical housing problems except in so far as these may affect the health of the occupants of houses. These technical building matters are in any case outside the field of the author's knowledge and experience.

But size of rooms, ventilation, lighting, and the provision of kitchen, washing, toilet and drainage facilities are within the public-health physician's responsibilities, and he ought to have rational views about them. He is not interested in how a drain is constructed, but he is concerned that there should be

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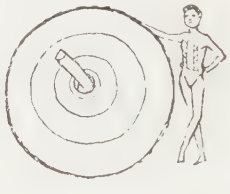

Stone money — used in the Caroline Islands, often larger than 10 or 12 feet in diameter

Left. Head money — flying fox fur string wound round a wooden face, was an early form of currency in the New Caledonia

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one; he is interested in what goes into it, and what becomes of it, since in all these matters, nuisance and danger to public health may arise from defective planning and construction.

The doctor whose specialty is public health is therefore an essential member of the housing team, and no apology is necessary for his intrusion since housing in its sanitary aspects, including overcrowding, is intimately related to the prevalence and spread of many diseases.

Moreover, the socio-medical problems of income and expenditure in relation to housing, food supply, nutrition and all that goes for happy and healthy living, whether in village or in town, are of intimate concern to the public-health administrator, and there is some danger that concentration on technical specialties within the field may divert the attention from the overall problem.

It is therefore the hope of the writer that these comments on aspects of housing may stimulate consideration not only of the technical details but of the whole problem of housing in its present but much more in its rapidly changing and developing aspects, and of its social implications.

Marine Engines For Pacific Fishermen

(Continued from page 53)

any sign of an opening, top, bottom, or one side, and both edges fit flush all around the perimeter, the shafts are in alignment. If an opening is showing at any place on the edge of the couplings, or the edges stand out beyond one another, the shafts are not in alignment. The same applies of course, between the engine and shaft couplings (see fig. 2).

The bolting of the engine to the engine beds is also very important. The use should be avoided of "lag bolts" or coach screws, which are hard to install correctly and difficult to keep tight.

Holding-down bolts should *never* pass through the hull planking. Undue leaking will occur, and there is always a grave risk of losing your vessel if the head of the bolt pulls through the planking, due to vibration or undue tightening.

Fig. 3 shows two simple ways of bolting the engine to the beds, with the advantage of being able to tighten up on the bolts at any time. In the sketch, "a" is a very simple bed for a small engine, while "b" depicts a bed for a larger engine. The holding-down bolts in "b" could perhaps go right through both the aligning and main bearer, but if this is impossible then the method shown is quite satisfactory.

(To be continued)

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SPC Conference On Tuberculosis In Pacific

(Continued from page 28)

consideration given to variations in all these factors.

When the methods and facilities for case finding were discussed it became obvious that the greatest need is for trained staff and adequate laboratory and radiological facilities. It is imperative to be in a position to demonstrate tubercle bacillus in order to confirm a diagnosis; it was recommended that simple, well-tried techniques should be used.

Under certain conditions a positive reaction to a tuberculin test is of great diagnostic value when it is related to the age of the patient, the size of the reaction and any sudden increase in the sensitivity of the individual.

The basic importance of radiography was unanimously recognized. Miniature films were considered to be of very great value for case finding and, if of high quality, are almost as useful for diagnostic purposes as standard size films. Radiation hazards were recognized but the Conference considered that, provided certain precautions were taken, x-ray case finding programmes should be continued.

The Conference then discussed case management from two aspects: the community aspect and that of the individual. Tuberculosis should be a notifiable disease and all cases notified should be entered in a central register. The Conference, however, considered that the voluntary co-operation of the community is preferable to the strict enforcement of legal compulsory measures. Restrictive legislation may sometimes be necessary but it should be minimal and exercised with understanding. It may sometimes be unavoidable to enforce compulsory measures for undisciplined, chronic cases disseminating drug resistant organisms. Community education is imperative and such a programme should make use of voluntary organizations and the possibilities offered by the established educational systems. Educational aids such as posters, pamphlets, slides and films should always be closely adapted to local conditions.

The Conference stressed that domiciliary and ambulatory treatment services should receive priority. Initial short term intensive treatment in hospital is desirable for the greatest possible number of infectious cases. This does not necessarily imply costly installations but can be carried out in simple buildings. After treatment in hospital, long term ambulatory treatment at home should be continued under strict medical supervision. Domiciliary services should be organized for all patients who cannot be admitted to hospital. Chemotherapy should be prolonged and combinations of the drugs available used in high doses. Major chest surgery should not be overemphasized in the overall programme of control.

Chronic cases of active pulmonary tuberculosis need not be kept in hospital. Isolation, however, is imperative. This could sometimes be provided in special villages for tuberculosis patients.

The management of known contacts was also discussed. The groups of subjects most likely to contract the disease in Pacific communities still require exact definition. The Conference, however, agreed that all negative tuberculin test contacts should be given B.C.G. vaccine and all positive reactors should be carefully examined and treatment given when required, particularly to those in whom the test is strongly positive, regardless of their age.

It was felt that tuberculosis prevention can be achieved through the B.C.G. vaccination, through preventive chemotherapy, chemoprophylaxis and general public health measures.

Although the efficacy of B.C.G. vaccination in all the South Pacific communities is not known because of the short period during which the method has been used, the Conference recognized the value of this vaccination in protecting skin test negative individuals.

Chemotherapy with isoniazid is recommended for any recently infected person in order to reduce the risk of development of the disease. On the other hand the Conference felt that sufficient information was not at present available on the use of isoniazid as a preventive measure in a whole community, and considered that it should be reserved for the prevention of the disease in contacts.

The Conference agreed that the use of public health approaches should in no circumstances be neglected. Their application, together with B.C.G. vaccination, preventive chemotherapy and chemoprophylaxis can only accelerate progress in the control of the disease.

The Conference considered that conditions in some communities of the Pacific are such as to provide opportunities for research on yet unsolved problems associated with the prevention of tuberculosis, and recommended the establishment of pilot projects in this field.

Throughout the debates, the Conference emphasized that tuberculosis control should be entrusted to a single authority in any given territory and that it is highly desirable that methods and techniques should be uniform in practice not only in each territory but also in the region under discussion. A Committee on Adoption of Epidemiological Standards was established and its recommendations approved.

In establishing tuberculosis services in under-developed areas, experience has shown that for reasons of efficiency and economy it is necessary to formulate a plan of control by which priorities are laid down, and services enabled to develop as required. Such a plan was submitted to the Conference by a metropolitan specialist and forms part of the formal report.

Conference Proposals For SPC Assistance

Finally, the Conference considered the ways in which the South Pacific Commission could assist, by co-ordinating territorial activities in tuberculosis control and by helping administrations in the development of their programmes.

The Conference recommended that the Commission should:

(1) participate in the preparation of an analytical bibliography on tuberculosis in the Pacific along the lines of the project submitted to the Research Council in 1955 which was studied and approved by that agency, and

(2) provide the services of an epidemiologist to assist the territorial administrations on request in the organization of epidemiological surveys and the collection of statistical data on tuberculosis.

Full Programme

The Conference programme was a very busy one. The time not spent in full meetings was taken up by committee and working party meetings, and the writing and discussion of the draft report.

However, there were also numerous and very enjoyable social activities. Official and private entertaining, excursions and visits, fishing expeditions and swimming enabled the participants to appreciate to the full the warm hospitality of the community of American Samoa, the grace and charm of local singing and dancing, and the peaceful beauty of the scenery. The friendly atmosphere and the unanimous wish to achieve useful work soon led the participants to form a united and friendly group, able to discuss matters quite freely while always respecting each other's personal point of view.

Before concluding their programme and parting, the members of the Conference, recognizing that their meeting had been most useful, expressed the belief that the results achieved would be of value to all those responsible for tuberculosis control in the Pacific. They gave it as their view that further similar meetings be held on a regional or subregional basis. Finally, they thanked the South Pacific Commission for arranging the Conference, and paid tribute to Governor Peter T. Coleman and to all those whose work and interest had contributed to the success of the Conference.

ORIGINAL: *French.*

PACIFIC READING

Material in this section is contributed by the South Pacific Commission Literature Bureau. Any enquiries relating thereto should be directed to Box 5254, G.P.O., Sydney, Australia.

Notes and News

Timber House Construction Book for Niue. At the request of the Niue Administration, the Bureau has arranged for the printing of an amended edition of the book *Simple Methods in Timber House Construction for Cook Islanders.* This version is similar in appearance to the original edition prepared for the Cook Islands Administration, but the text has been revised slightly to make it more suitable for Niuean conditions.

Single specimen copies of this book, with details of production costs, are available from the Bureau.

Dental Posters for Fiji. A series of four dental posters, depicted in the accompanying illustration, has been produced by the Bureau in co-operation with and on behalf of the Dental Division, South Pacific Health Services, Fiji. In this instance the rough drafts for the posters were supplied from Fiji, and the Bureau then arranged for the necessary artwork and printing.

Each poster measures 20″ x 14″ and is attractively printed in four colours. Topics covered are: *This is a Tooth Cut in Half; This is How Your Teeth Decay; How Decayed Teeth are Treated;* and *Gum Disease.* One interesting feature of this production was the use by the artist of printed shading film of varying intensities to achieve certain half-tone effects; without going into technicalities it is sufficient to say that this procedure simplified plate-making problems and enabled a considerable saving in production costs.

Inspection copies of these posters, together with production costs, are available on request from the Literature Bureau, Box 5254, G.P.O., Sydney. We shall welcome enquiries from territories concerning the production of similar or other types of posters.

New Literature Bureau Publications. Several new publications now in production by this Bureau in association with publishers are nearing completion, and should become available within the next few months.

Messrs. Longman's, Green & Co. are producing two new titles in the Bonito Series, which is confined to books of a factual and historical nature with an authentic Pacific background. One, entitled *Nauru, the Phosphate Island,* has been written by Mr. George A. Pittman, Director of Education, Nauru, and deals with the discovery and mining of phosphate rock on this tiny Pacific island by the British Phosphate Commission. The other, entitled *The Story of Nabetari,* relates the epic voyage of a young Gilbertese Islander who escaped from the Japanese on Ocean Island during World War II and drifted in an open canoe for seven months before reaching safety. Both books are well illustrated with excellent back-and-white line drawings. They are intended for either adult use or school reading at about 4th-6th year level.

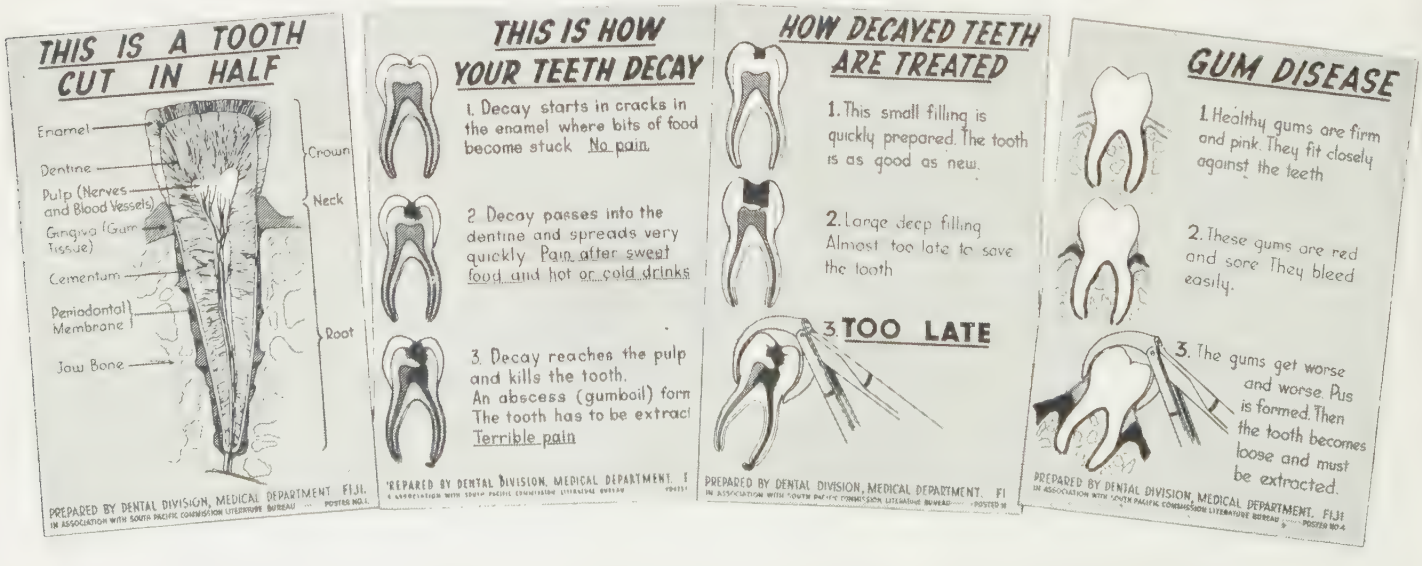
Another book expected shortly is *Stories From Papua.* This is being published in association with Macmillan & Co. This 40-page book contains twelve folk and animal stories with an island background, re-told in simple English by R. N. Gallyon. Each story is illustrated with attractive line drawings and will, we feel, prove very popular with island readers. The published price in London is stg. 1/4.

The same publishing firm will also be producing *Heroes From Papua and New Guinea,* a companion volume to *Heroes From Fiji* in the Pacific Heritage series of supplementary readers. This collection of deeds of bravery has been written by Peter Livingston, of the Department of Education, Papua and New Guinea, who is also the author of *The Magic Pot.* The price of this book will be stg. 2/2 per copy.

The Bureau is anxious to produce more titles in these series of supplementary readers, and would welcome suggestions and manuscripts for consideration.

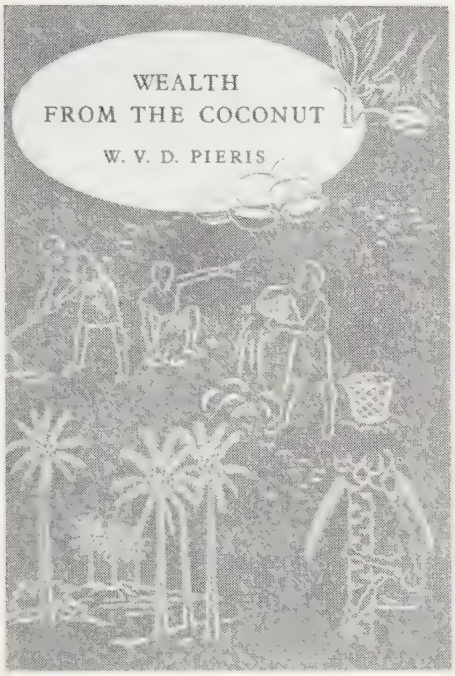
Where to Purchase Books. During recent weeks we have received a number of enquiries from people in the islands concerning the purchase of publications reviewed in the Bureau's book news-sheet, *Some Recent Acquisitions.*

(Continued on page 70)


THIS IS A TOOTH CUT IN HALF
Enamel
Dentine
Pulp (Nerves and Blood Vessels)
Gingiva (Gum Tissue)
Cementum
Periodontal Membrane
Jaw Bone
Crown
Neck
Root
PREPARED BY DENTAL DIVISION, MEDICAL DEPARTMENT FIJI.
THIS IS HOW YOUR TEETH DECAY
1. Decay starts in cracks in the enamel where bits of food become stuck No pain.
2. Decay passes into the dentine and spreads very quickly Pain after sweet food and hot or cold drinks
3. Decay reaches the pulp and kills the tooth. An abscess (gumboil) form The tooth has to be extract Terrible pain
PREPARED BY DENTAL DIVISION, MEDICAL DEPARTMENT. F
HOW DECAYED TEETH ARE TREATED
1. This small filling is quickly prepared. The tooth is as good as new.
2. Large deep filling Almost too late to save the tooth
3. TOO LATE
PREPARED BY DENTAL DIVISION, MEDICAL DEPARTMENT. FI
GUM DISEASE
1. Healthy gums are firm and pink. They fit closely against the teeth
2. These gums are red and sore They bleed easily.
3. The gums get worse and worse. Pus is formed. Then the tooth becomes loose and must be extracted.
PREPARED BY DENTAL DIVISION, MEDICAL DEPARTMENT. FIJI

This series of four dental posters was produced by the Literature Bureau for the Dental Division of the South Pacific Health Service, Fiji.

Available in Eight Languages!



Simply written and well illustrated with 33 two-colour line drawings, this book describes practical methods for improving the quality and yield of existing coconut plantations in the Pacific Islands.

TOPICS DISCUSSED INCLUDE:

Selection of Mother Palms; Selection of Seed Nuts; Coconut Nurseries; Selection of Seedlings; Planting Distance and Preparation of Seedling Holes; The Transplantation and Care of Transplanted Seedlings.

Copies of either English, French, Fijian, Samoan, Tongan, Pidgin, Maori (Rarotongan) or Malayan language edition are available through your local bookseller.

Or from:

South Pacific Commission
Literature Bureau,
Box 5254, G.P.O.
Sydney, Australia.

PRICE *Stg.2/6, plus postage.*

OXFORD ENGLISH COURSES

FIRST READING BOOKS

The need for a new series of supplementary readers arises in changes of fashion no less than in methods of teaching English as a foreign language. Since one of the purposes of supplementary readers is to get students interested in reading, they need to be attractively printed in a large type and with plenty of illustration. *The New Oxford Supplementary Readers* will satisfy these new conditions, but at the same time retain the important principles of existing series.

TOWN RAT AND COUNTRY RAT	1/-
A PRESENT FOR MOTHER	1/-
THE OLD WOMAN AND HER COCK	1/-
SHALL WE MEET THE LION?	1/-

A new series of supplementary readers is now being produced for use in conjunction with the *Oxford English Course for Papua and New Guinea.* The first two books in this series are:

WHY COCKS CROW	3/-
TUI LIKU AND THE GIANTS	3/-

The vocabulary of these 48-page books is based on the words learnt in the *First Book, Second Book,* and *Third Book* of *Oxford English Course for Papua and New Guinea,* and the stories in them have been chosen from various regions of the southern Pacific area.

UNDER THE MANGO TREES	2/-

This is the story of Dinah Frank of Rogea, the first of a series of short lives of outstanding men and women from Papua and New Guinea. They are being produced in close collaboration with the area Director of Education.

All prices are quoted in Australian currency

OXFORD UNIVERSITY PRESS

346 LITTLE COLLINS STREET MELBOURNE

MUSIC OF NEW GUINEA

An Introduction

Sheridan and Smythe Collections

EDITED BY R. SHERIDAN

This is a comprehensive introduction to the authentic native music of New Guinea, presenting seventy-three examples from fourteen geographic areas. Various styles of singing are heard, both solos and massed choirs. Instruments include panpipes, bamboo flutes, bamboo trumpets, stamping tubes, skin drums, slit drums, bamboo jew's-harp, bamboo dulcimer and others.

This record will appeal to everyone interested in exotic and out-of-the-way music, as well as to specialists. Map and notes included.

12" LP Flexible Microgroove, D2

Available from all leading record shops

Owners of tapes of primitive music are invited to contact—

WATTLE RECORDINGS

131 Cathedral Street, Sydney, Australia

Specialists in Australian folk and primitive music

Please forward a free catalogue of Wattle records to:

NAME .....

ADDRESS .....

Recordings Of Pacific Islands Music

By Judith Flanagan

IN the last two years the Commission has issued eight recordings of Pacific islands music, in order to attract attention to the possibilities of this previously-neglected field. This is one of the most interesting aspects of the Pacific Islands Broadcast Recordings Service, which began several years ago with the aim of providing an additional source of programme material for island broadcasting stations.

The expanding broadcasting services in the Pacific area have done much in recent years to encourage local music within their own territories, and with their co-operation the Commission has built up a collection of recordings (mainly on magnetic tape) from many parts of the Pacific.

These recordings have been circulated to many island broadcasting stations, but because the audience reached in this way is still a limited one, the Commission has decided to make a small number of discs for general sale in the Pacific and elsewhere. It is hoped that this experiment will lead to a wider appreciation of island music and that it may ultimately attract the interest of commercial recording companies.

Details of the Commission's recordings, which were processed from tape recordings made in the British Solomon Islands and the Cook Islands, are as follows:

Solomon Islands Recordings

SOLOMON DAKEI AND HIS SOLOMON ISLANDERS.
PRS 55 7", 45 r.p.m. Extended Play. A.14/-
SIDE 1: *Walk about long Chinatown.*
Talotana buloqu—Sad heart.
SIDE 2: *Auki love song.*
Puni munu munu—Morning dew.

This is the only microgroove recording made by the Commission to date, and is probably the first microgroove recording ever made of Solomon Islands music. The songs have all been composed in recent years, two of them being in Pidgin English and two in Roviana, one of the languages of the Western Solomons. The singers are three young nursing trainees, and the band consists of steel guitar, guitars, ukulele and slap bass. The original recording from which the disc was processed was made by the Solomon Islands Broadcasting Service.

WESTERN BOYS' STRING BAND.
PR 2791. 10", 78 r.p.m. A.10
SIDE 1: *Koa kuliusu pa qua kinoa—Deep in sorrow*
SIDE 2: *Kare ka chaqo—There is nothing to worry about.*

These are Roviana love songs, performed in modern style by a string band in Honiara. The original tape recording was supplied by the Solomon Islands Broadcasting Service.

GROUP OF SOLOMON ISLANDS SONGS.
PRX 4048. 12", 78 r.p.m. A.12/-
SIDE 1: *Two songs by the people of Sasavale village, New Georgia.*
SIDE 2: *Four songs by the girls of Bunana Melanesian Mission School.*

The original tapes from which this and the following disc were made were recorded in the field by Mr. N. K. Wallis of Sydney. The songs on Side 2 are from Gela, Guadalcanal, San Cristobal, and Sikaiana, and are sung unaccompanied; details of the Sasavale songs are not available.

SIMBO ISLAND BAMBOO BAND.
PRX 4049. 12", 78 r.p.m. A.12/-.
SIDE 1: *Beautiful body.*
SIDE 2: *Living alone in the sunset.*

This is one of the most interesting of the Solomon Islands recordings, because the rhythm is provided by bamboos and guitars. The bamboos are of different sizes, each with its own note, and are either pounded on the ground or hit with a slapper. The guitars are tuned to the bamboos. The words of the songs are modern, but the melodies are based on traditional rhythms.

Cook Islands Recordings

FOUR COOK ISLANDS SONGS.
PRX 4135. 12", 78 r.p.m. A.12/-.
SIDE 1: *To moemoea—Your dreams.*
Maine e tangi mai iaku—Dearest have pity on me.
SIDE 2: *Mama e, e vaka—Mother, I see a canoe.*
O mai taku ei e mama—Give me my ei mother.

These are all modern Cook Islands songs, with guitar or ukulele accompaniment. Two of the items are sung by a young woman school teacher, who has a very pleasant singing style. The tape recordings from which this and the three following discs were made were provided by the Community Development Officer in Rarotonga, who is in charge of broadcasting in the Cook Islands.

COOK ISLANDS RHYTHMS AND CHANTS.
PRX 4136. 12", 78 r.p.m. A.12/-.
SIDE 1: *Manihiki drums.*
Kua ao ote po—Night and day.
SIDE 2: *Ute.*
Atiu chant.

The first item is rhythmic drumming by the Manihiki islanders, using wooden *pates* (hollowed logs of varying sizes), a goatskin-covered drum and a kerosene tin. The second item is a modern love song, performed by Katai's Avatiu Band. The ute, or traditional ballad-type chant, tells of copra shipments from Atiu to Tahiti. The rhythm of the ute is usually the same, but new words are composed from time to time to commemorate important events. The chant from Atiu island is a traditional one, so old that

TROPICAL LIBRARY

Geography Series *by* GWEN CROSS

The latest addition to the Tropical Library will consist of six physical geography books written on the same lines as THINGS WE USE.

Ready February
Book 1. OUR HOME
Book 2. OUR MOUNTAINS

Ready July
Book 3. OUR RIVERS
Book 4. OUR OCEAN
Each probably 2s. 3d.

In preparation—OUR CLIMATE, OUR WEATHER

STAFF LIBRARY

Edited by C. R. V. BELL, O.B.E.

The first three books in this series, *Teaching Lively English*, *Examination Time* and *The English System of Education*, are fast establishing themselves as popular reference books for those concerned with teaching.

Two new titles will be ready in March of this year—
BOARDING SCHOOLS, H. A. W. Chapman. *Illus.* *Probably 2s. 9d.*
SCHOOL DISCIPLINE, Lord Hemingford. *Illus.* *Probably 2s. 6d.*

In preparation
Arithmetic, Good Handwriting, Letter Writing, Reading, Visual Aids, Practical Art, Nature Study, History, Activity and Group Methods.

NEW SWAN SHAKESPEARE

Edited by BERNARD LOTT, M.A., B.LITT.

The first edition of Shakespeare specially prepared for overseas students.

Now available
MACBETH. *Paper, 4s. 3d. Cased, with photographs, 6s. 6d.*

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By ROY BROWN

This book, the 43rd title in *The Children's Bookshelf*, tells the well-loved tales of religious literature in simple and clear English, so that their impact is immediate and attractive. With half-tone frontispiece in colour, and many line drawings in the text.
Limp 2s. 3d. *Library Edition 3s. 6d.*

TESTS FOR JUNIORS

Vocabulary Exercises for Third Year Juniors
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Vocabulary Exercises for Fourth Year Juniors
By N. G. FILMORE *2s. 6d.*

General English Tests for Fourth Year Juniors
3s.

Comprehension Tests for Fourth Year Juniors
By K. S. ANDERSON *3s.*

Do You Understand?
Comprehension Exercises for First Year Juniors
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BRITAIN IN FIJI 1858-1880

J. D. Legge

This detailed study begins with the appointment in 1858 of a British consul in Fiji; it discusses the coming of cotton planters, the development of British policy towards the area, and why Britain accepted control sixteen years later. *Published in association with the University of Western Australia Press.* *Map 21s*

THE MODERN WORLD 1789-1957

S. A. Pakeman, C.B.E., M.C., M.A.

This fourth edition of a popular textbook gives a summary of events of the Second World War, together with post-war happenings. A valuable book for the 'Current Affairs' pupils.
Photographs and maps 12s

SABAH MEN AT WORK

F. G. Whelan, Education Officer, North Borneo

This second book in the North Borneo Social Series, published in association with the Department of Education, presents for children in primary schools a clear and complete picture of the occupations of the people of Borneo.
38 photographs. With questions *3s*

BOOK 1: *A School History of North Borneo* *2s 5d*

HOW? WHY? WHERE?

E. L. Gaylard

A series of six information books and six non-consumable workbooks for ages 6-8 years. All the books are profusely illustrated and the subjects covered are Water, Ships, Pottery, Wool, Cotton and Silk, and Flour. *1s 10d each*

MACMILLAN & CO. LTD.
St Martin's Street London WC2

the young people do not know the meaning of many of the words.

FOUR COOK ISLANDS SONGS.
PRX 4201. 12", 78 r.p.m. ..... A.12/-.
SIDE 1: *Tiare ora varu—The eight o'clock flower.*
Naai nga mararo maoa—Who owns these two cooked flying fish?
SIDE 2: *Marama.*
Te oriori nei au i te maru aiai—I was strolling in the shadows of the evening.

These four songs are performed in modern style, with guitar and ukulele accompaniment. The first item on Side 1 is sung by a group of Atiu boys, and *Marama* (a girl's name) is sung by a girl soloist, with chorus by the pupils of Aitutaki School.

TWO COOK ISLANDS SONGS.
PR 2893. 10", 78 r.p.m. ..... A.10/-.
SIDE 1: *Kua kamo mai koe kiaku e ine—You winked your eyes at me, my love.*
SIDE 2: *Moe mai ra e taku roti—Go to sleep my love.*

A group of sanatorium patients sings these two modern love songs, with guitar and ukulele accompaniment.

Most of the items on the eight recordings are modern island songs, which show the influence of European popular tunes and performing styles. They have, however, retained a distinctive local character, which makes them attractive to both Europeans and islanders. Sales of the recordings indicate that there is a growing interest in island music in the Pacific and elsewhere, and efforts will be made in 1959 to bring the results of the Commission's experiment to the attention of commercial recording companies. If these efforts are successful, it may not be very long before commercial recordings of island music become generally available.

Orders for the recordings listed above should be addressed to:

Social Development Section,
South Pacific Commission,
Box 5254, G.P.O.,
SYDNEY. Australia.

No charge is made for postage by surface mail.

Tourism In New Caledonia

(Continued from page 25)

flats, and this number will soon be increased to 165. To these may also be added ninety second- and third-class rooms which are still quite comfortable.

It is a pity that the provision of facilities in the hinterland has not kept pace, as this is undoubtedly causing a certain unbalance in tourist facilities throughout the territory. Appreciable efforts are, however, being made and are quite promising. Although at present there are only nine first-class rooms (or bungalows), plus eighteen second- and thirty-nine third-class rooms, building is in progress. The Isle of Pines will soon boast five bungalows with private baths, Ouvea ten, and Thio, on the east coast, eight.

It must also be mentioned that eighty new rooms are being planned for Noumea, three-quarters of which will belong to the *Société Touristique et Hôtelière*. In the near future this Association will be building a two-floor hotel including reception, bar, restaurant, four first-class flats and sixty first-class rooms.

Large Hotel For Noumea

Quite apart from these improvements, contacts have been made with a Franco-American group to study the possibility of building, in Noumea, a large hotel of between 100 and 200 rooms and flats. Because of the magnitude of the venture, financial assistance would come from the *Caisse Centrale de la France d'Outre-Mer* (Central Fund for French Overseas Territories) instead of the *Crédit de la Nouvelle-Calédonie*.

It is planned to increase hotel accommodation in the hinterland and the outlying islands by approximately 220 first-class rooms or bungalows. This figure includes the hotel at the thermal resort of La Crouen.

The budgetary estimates for all these improvements, excluding the largest hotel mentioned above, are of the order of 113 million Pacific francs (based on prices in July, 1957).

At the same time, folders are being used in the publicity campaign, and the reception of visitors and facilities for their recreation are being organized. Finally, improvements in Noumea include the widening of coastal driveway from the town to Anse Vata to sixty-five feet, the widest in any South Pacific island, and the lighting of the Adio Grotto, which should greatly enhance this beauty spot.

Short Cruises Planned

Apart from the many classical excursions by road, four boats now being equipped will run one- to three-day cruises. Plans are being studied in Hawaii for the building of a glass-bottomed boat carrying twenty passengers, intended for visits to the coral reefs. This boat will belong to the Yacht Club now being planned and whose club house will grace the lovely *Baie des Citrons*.

The local airline, Transpac, has just added three flights a week to the Isle of Pines, over and above the ten it already runs to Maré and Lifou. Many disused coastal airfields are being rehabilitated to enable flights within the island, which the above-mentioned company will operate with the 14-seater "Heron" it has recently purchased.

Aquarium A Notable Attraction

It is not possible to list here all the improvements planned or already carried out to promote tourism in New Caledonia. One achievement, however, which is the pride of Noumea, should be mentioned—the aquarium. Combining both scientific interest and beauty, it was finished in 1957 by the Catala-Stucki Foundation. It contains a unique wealth of underwater fauna and flora and its reputation, now international, is already a strong attraction to tourists.

All these efforts are now bearing fruit. In 1956 only 600 tourists stayed more than two days in New Caledonia and 666 in 1957, but by the end of the first half of 1958, 596 had remained in the island an average of twelve days. To this figure must be added 4,250 cruising travellers.

Revenue Increasing Rapidly

During the first six months of 1958 New Caledonia derived from tourism a revenue of approximately ten million Pacific francs against only eight million during the whole of 1957. As there is always more travelling done towards the end of the year, it is anticipated that income from tourism in 1958 will exceed twenty million Pacific francs, and forty million in 1959, that is to say, five times more than that in 1957.

This startling increase, which shows that returns in the tourist industry are immediate, must prove a great encouragement to all those interested in the development of the territory.

It has now been proved that nickel is not New Caledonia's only asset, and that the island possesses an abundance of natural beauties and pleasures well able to tempt travellers from far and near.

"Pacific Reading" Notes And News

(Continued from page 66)

The main purpose of this review list is to acquaint teachers, educationalists, departmental officers and others in the Pacific area with details of new books which may be of interest or assistance to them. Apart from its own publications, however, the Bureau does not stock copies of the books listed for re-sale, although we can often make available an inspection copy on request. Enquiries for the purchase of any of the books reviewed should be made to any good bookseller or direct to the publisher concerned.

South Pacific Commission Technical Papers

Copies of Technical Papers, which are published both in English and French editions, may be procured from the South Pacific Commission, Nouméa, New Caledonia, or G.P.O. Box 5254, Sydney, Australia. Except where otherwise stated, price per copy, post free by surface mail, is 2/- stg. (2/6 Aust., 2/3 Fijian, 30 cents U.S., 1 New Guinea guilder)*.

NUTRITION

18. **Report on Nutrition Investigations by the South Pacific Commission in 1950.** November 1951.
22. **Chemical Composition of the Milk of New Hebridean Mothers.** F. E. Peters, biochemist, South Pacific Commission. February 1952.
23. **Nutrition Research Conducted in New Hebrides during 1951.** Sheila Malcolm, nutritionist, South Pacific Commission. April 1952.
50. **Nutrition Investigation in New Caledonia.** Sheila Malcolm. October 1953.
63. **Diet and Nutrition in American Samoa.** Sheila Malcolm. August 1954.
83. **Diet and Nutrition in the Trust Territory of the Pacific Islands.** Sheila Malcolm. July 1955.
85. **Etudes sur la Nutrition et l'Alimentation dans les Etablissements Francais de l'Oceanie** (Summary and Conclusion in English). Sheila Malcolm. April 1955.
95. **Bibliography of the Nutritional Aspects of the Coconut** (revised edition of T.P. 58). F. E. Peters. September 1956.
100. **Chemical Composition of South Pacific Foods**—An Annotated Bibliography. F. E. Peters. January 1957. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
106. **Some Food Problems In The Pacific Islands.** H. S. McKee. May 1957.
113. **The Diet of Mothers and Children on the Island of Guam.** Sheila Malcolm. January 1958.
115. **The Chemical Composition of South Pacific Foods.** F. E. Peters. January 1958.
118. **Nutrition and the Papuan Child.** H. A. P. C. Oomen and S. H. Malcolm. April 1958. (8/- stg., 10/-A., 9/-F., $1.20, 4G.)

PUBLIC HEALTH

12. **Tuberculosis Investigations by the South Pacific Commission in 1950.** May 1951.
24. **A Survey of Leprosy on the Island of Nauru.** Dr. C. J. Austin, Director, Makogai Leprosy Hospital, Fiji. April 1952.
27. **A Survey of Leprosy in the British Solomon Islands Protectorate.** Dr. C. J. Austin. July 1952.
56. **Leprosy in Netherlands New Guinea.** Dr. Norman R. Sloan. April 1954.
57. **Leprosy in the Trust Territory of the Pacific Islands.** Dr. Norman R. Sloan. April 1954.
62. **Leprosy in American Samoa.** Dr. Norman R. Sloan. July 1954.
64. **Dental Conditions in School Children of American Samoa.** Dr. Raymond G. Neubarth. August 1954.
67. **Ophthalmological Survey of the Trust Territory.** Dr. H. E. Crawford. September 1954.
69. **Leprosy in Western Samoa and the Cook Islands.** Dr. Norman R. Sloan. October, 1954.
96. **Health Education In The South Pacific.** G. Loison and L. L. Keyes. September 1956.

MOSQUITO-BORNE DISEASES

17. **Conference of Experts on Filariasis and Elephantiasis, Tahiti: Summary of Proceedings.** September 1951.
33. **A Survey of Malaria in the British Solomon Islands Protectorate.** Dr. R. H. Black, School of Public Health and Tropical Medicine, University of Sydney. November 1952.
60. **Some Aspects of Malaria in the New Hebrides.** Dr. R. H. Black. May 1954.
61. **Malaria in the Trobriand Islands.** Dr. R. H. Black. May 1954.
65. **Annotated Bibliography of Filariasis and Elephantiasis.** September 1954. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.)
66. **Distribution of Filariasis in the South Pacific Region.** Dr. M. O. T. Iyengar. September 1954. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.)
68. **Malaria in the Torres Straits Islands.** M. Josephine Mackerras and Dorothea F. Sandars. October 1954.
80. **Malaria Control and Research in Netherlands New Guinea.** Dr. R. H. Black. March 1955.
81. **Malaria in the South-West Pacific.** Dr. R. H. Black. March 1955.
86. **Distribution of Mosquitoes in the South Pacific Region.** Dr. M. O. T. Iyengar. 1955. (8/- stg., 10/-A., 9/-F., $1.20, 4G.)
88. **Annotated Bibliography of Filariasis and Elephantiasis. Part 2.** Dr. M. O. T. Iyengar. Jan. 1956. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
104. **Developmental Stages Of Filariae In Mosquitoes.** Dr. M. O. T. Iyengar. May 1957.
105. **An Investigation On Filariasis In The Berau Region.** H. de Rook. May 1957.
109. **Annotated Bibliography of Filariasis and Elephantiasis. Part 3.** Dr. M. O. T. Iyengar. July 1957. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
110. **Enquete epidemiologique et entomologique sur la Filariose de Bancroft en Nouvelle-Caledonie et dependances.** M. Lacour et J. Rageau. (With Summary in English). August 1957.
117. **La repartition geographique des moustiques en Nouvelle-Caledonie et dependances.** J. Rageau. Mars 1958. (Available in French only).

TROPICAL CROPS

19. **Report on Copra Grading.** November 1951.
21. **Note on the Mycoflora of Rice Seed in the Territories of the South Pacific.** Dr. F. Bugnicourt, Director, Institut Francais d'Oceanie. January 1952.
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